BBL
BLASLAND, BOUCK & LEE, INC
engineers & scientists

Transmitted via U.S. Mail

February 4, 2002

Mr. Matthew T. Mellon
U.S. Environmental Protection Agency
Region III
M/C 3HS23
1650 Arch Street
Philadelphia, PA 19107

Re: Draft Responses to EPA Comments
BBL Project #: 387.73

Dear Matt:

Enclosed is a hard copy of draft responses to comments of the U.S. Environmental Protection Agency (letter dated October 25, 2001) on the revised draft Remedial Investigation (RI) Report (April 1999) for the Former Koppers Company, Inc. Newport Site in Newport, Delaware.

Should you have any questions, please contact either Jane Patarcity, Maryann Nicholson, or me.

Sincerely,

BLASLAND, BOUCK & LEE, INC.

David W. Hale, P.E.
Vice President

DWH/lar
Encls.

cc: J. Patarcity
M. Nicholson
N. Gensky
D. Lipson
P. Kocak

6723 Towpath Road • P.O. Box 66 • Syracuse, NY 13214-0066
Tel (315) 446-9120 • Fax (315) 449-0017 • www.bbl-inc.com

General Comments

Throughout the Revised Draft RI Report (dated April 1999), a number of issues arise several times over. These general comments summarize both the most significant revisions required, as well as those issues which pervade the document, and must be addressed in all instances throughout (all or most of which are listed in the "Specific Comments" section).

General Comment 1:

One of the primary difficulties in the review of the submitted document was to ascertain whether or how previous comments had been addressed. Since this is a large document, with a broad range of issues to cover, I have a few suggestions to assist in the review of the next revision. Please submit a response package that specifically responds to how each comment is addressed. Also, please prepare and submit a "red-lined" version to the RPM (2 copies) and to TetraTech (1 copy), who will use it to assess how comments have been addressed. The response letter in the revised document did not provide sufficient detail.

Response:

As requested, a response package will be prepared to assist EPA and its contractor in reviewing the RI. As discussed in our December 19, 2001 meeting, we feel that obtaining your concurrence will expedite acceptance of the RI and further minimize any future comments on the document. A "red-lined" version will be submitted following EPA's concurrence with our proposed modifications.

General Comment 2:

Despite previous comments from the State of Delaware, this report was again submitted without the state-required signature of a professional geologist ("P.G.") licensed in Delaware. Please redress this matter before resubmitting the document.

Response:

The next version of the revised RI will have an appropriate signature, as requested.

General Presentation

General Comment 3:

Conclusions should always follow a clear presentation of the data on which they are based. In the current submittals, many of the conclusions appear to be unsupported or incorrect. The document should summarize actual data, and then clearly indicate what conclusions are being drawn from that data. If a subset of data is used, please explain how that subset of data was chosen as well as the rationale for excluding any data. The reader should be able to assess all of the data and come to the same conclusion.

Response:

While this is a general comment, specific comments are provided in the EPA comment letter and other topics were discussed in the December 19, 2001 meeting (e.g., incorporation of Figure 2-2 of the FS into the RI to clarify nature and extent of constituents, sensitivity analysis for metals, enhanced discussion on assumptions used to delineate nonaqueous phase liquid [NAPL], syntax and diction modifications). The revised RI will more clearly summarize data and clearly present conclusions, as appropriate, to address EPA's oral and written concerns with data interpretation.

As agreed upon at the meeting, we anticipate conferring with EPA to reach agreement on specifics regarding data and conclusions. We envision this as being a series of conference calls and meetings to resolve any outstanding issues regarding site data and conclusions.

Local Geology

General Comment 4:

The discussion of local geology is both inaccurate and incomplete. EPA made this comment on the first draft; however, the comment was not adequately addressed. A number of references exist in the literature (see list under "Specific Comments") pertaining to the nature of the Columbia and Potomac Formations, and these documents should be referred to. Those references reviewed by EPA are listed in the "Specific Comments" section of this document. In short, the upland subsurface lithology can more accurately be described as:

- *Fill and Recent (Pleistocene) material, which overlies the...*
- *Columbia Formation, consisting of interbedded silts, sands and some clay, which in turn overlies the...*
- *Upper Potomac Formation, also consisting of silts, sands and some clay in a discontinuous layer, which separates this unit from the lower-most...*
- *Lower Potomac Formation, which is similar to the Upper Potomac, and which is ultimately overlying...*
- *bedrock, found at a depth range of 90-120 feet below ground surface.*

Response:

We do not feel that the discussion of the local geology was totally inaccurate and incomplete, and believe that adequate revisions were made in the RI Report submitted in 1999. However, the geological description will be revised to incorporate the characterizations and reference the appropriate sources. More details are provided with the specific comments. (For example, for more specific information, see the response to Specific Comment 15.)

In evaluating the information, it was concluded that minimal language will need to be provided in the report. EPA's description varies from the RI description only by dividing the Potomac Formation into upper and lower members. A general characterization will be incorporated into Section 3, Physical Characterization, and references will be cited. Any specific comments will be addressed appropriately.

It appears this discussion will not alter the RI conclusions because: 1) adequate information in the site geologic logs is not available to distinguish between the upper and lower members of the Potomac Formation; 2) attempts to distinguish between the upper and lower members of the Potomac Formation are a matter of scientific interpretation and 3) if these issues were resolved, it is uncertain if this would result in substantial changes in evaluating the nature, extent, fate, and transport, or remediability of site-related constituents in the RI or change the evaluation and selection of site remedies in the FS.

General Comment 5:

The Columbia and Potomac aquifers together have been described in local geologic literature (such as those references listed under "specific comments") as a leaky, interconnected aquifer system.

Response:

Similar to General Comment 4, this general description of the local geology as described in the literature will be incorporated into the general characterization with the appropriate references cited. Because site-scale hydrogeologic heterogeneities will control the fate, transport, and remediability of site-related constituents, we believe that site-specific data carry greater weight during the RI and FS process. We do not feel that our interpretations will change substantially unless there are definitive, site-specific data that necessitate such reinterpretation.

General Comment 6:

While the DuPont Newport RI is included as a reference, there was neither a discussion of the groundwater flow direction within the Potomac Aquifer beneath the Christina River nor any citation to this report in Section 3.5.2, Lower Hydrostratigraphic Unit. The consistent downward vertical gradients of ground water found in the DuPont RI was not discussed in this report's narrative. Specifically, the Potomac aquifer does not discharge to either Hershey Run, White Clay Creek or portions of the Christina River. Rather, ground water within the Potomac aquifer likely flows beneath these surface water bodies.

Response:

The revised RI will make note of these likely conclusions.

Potentiometric flow directions in the monitored portion of the Potomac aquifer were evaluated in the RI and depicted on Figures 3-12 and 3-13 for high tide and low tide monitoring events, respectively. Given the fact that the site groundwater monitoring network is sufficient to evaluate the nature, extent, fate, and transport of site constituents, as well as the remediability of site-related groundwater constituents, the RI Report does not speculate on whether groundwater within the Potomac aquifer flows beneath these surface water bodies. However, although the hydraulic gradients discussed in the DuPont Newport RI may not necessarily be applicable to this site, we agree to revisit the DuPont Newport RI, discuss the vertical gradients observed at that site, and refer to them, as appropriate, in the Koppers Newport RI.

General Comment 7:

The DuPont RI also contains information regarding background sediment values, which appeared high as presented in this report, Table H-3 in Appendix H. The information from the

DuPont Phase I and II river sampling may provide a more realistic indication of what should be considered background concentrations for Cd, Pb, and Zn. As Appendix H was not revised, please review the material from the DuPont RI, and include a reference or table as appropriate.

Response:

The RI for the DuPont Newport Site did sample background locations within the Christina River. While the sampling locations were initially agreed upon by the agencies, the locations were subsequently rejected as background because of the high concentrations found. The Phase I and Phase II sampling investigations were conducted as part of the remedial design/remedial action (pre-remedial design). These investigations did not evaluate or define background concentrations. The purpose of these investigations was to identify areas where remedial action may be necessary. Much of the sediment data collected were focused on cadmium, lead, and zinc, as indicated in the comment. As appropriate, the DuPont Newport RI River data will be utilized or referenced.

General Comment 8:

As indicated by a response to a comment, please discuss the outcome of the request to the University of Delaware Geology Department, USGS, and Delaware Geological Survey to obtain more current pertinent hydrogeologic studies and literature.

Response:

We have received hydrogeologic studies and literature from the U.S. Geological Survey, the Delaware Geological Survey, and other institutions as set forth in Specific Comment 15. Relevant information from these studies/literature will be provided in the revised RI Report.

Clay Layer/Columbia and Potomac Formations

General Comment 9:

The document repeatedly makes claims of a continuous clay layer beneath the entirety of the Site. Based on your comments at our recent meeting, EPA recognizes that Beazer/DuPont now understand that the underlying clay layer is not likely continuous; nevertheless, we are providing comments on the document as it exists. Neither the data presented, nor literature of local geology reviewed support the claim of a continuous clay layer. The Columbia and Potomac Formations are fluvial in origin, and as such are laterally quite variable. They have been described in the literature as an "interconnected system," and as having variegated clays with interbedded silts, sands and gravel. While some of the boring logs for the Site describe the "clay," the lab analytical data for some of those same samples identify partical [sic] *size distributions more consistent with silt or sand, not clay. The ground water data for the Site also indicate a connection between the Columbia and Potomac aquifers (e.g., similar flow direction, similar response to tidal fluctuations, and varying differences in hydraulic head). EPA understands that there may exist a competent clay layer functioning as an aquitard between these aquifers at other Sites, but at this Site, which is especially large in size, it is not surprising to find the lateral variability of these deposits occurring within the Site boundaries.*

In summary, the data indicate, and it is supported by the literature reviewed by EPA, that there is not likely a continuous clay beneath the Site. There are areas where lenses or stringers of clay

with low permeability will inhibit downward flow of both ground water and NAPL, but due to the lateral variability and heterogeneity of the subsurface sediments, the "clay layer" does not present the kind of vertical barrier to contaminant transport that the document alleges. It is therefore necessary to reexamine the existing data for any indications of impacts to the Potomac aquifer, and to better present the current nature and extent of subsurface contamination using the large body of existing data. EPA believes that the detailed delineation can be deferred to the Remedial Design phase, as there is ample information to make estimations sufficient to reach a Record of Decision.

Response:

Over the past several years, we have discussed these same clay layer issues on numerous occasions. We understand EPA's concerns that the clay layer does not provide a continuous barrier to potential migration. We in turn have stated up-front that there are data gaps regarding the clay layer (i.e., borings were not drilled deep enough to encounter the clay layer) and that more data may be necessary in the future if this issue cannot be resolved.

Whether or not the clay layer is continuous, the site data in fact show that there is a low-permeability, fine-grained layer of saturated soils that appears to bisect the Potomac and Columbia aquifers that is composed of various fractions of clay, silt, and fine sand. Regardless of whether this layer is truly a continuous clay layer or not, the site data on boring logs (as described in detail in the response to General Comment 12) show that it acts as an effective "capillary barrier" to downward vertical NAPL and dissolved constituent migration. From this perspective, the structural characteristics of this capillary barrier are important in completing the RI, and we believe that Figure 3-7 is useful in evaluating the fate, transport, and remediability of site-related constituents. Therefore, we agree to change the title of this figure by deleting the word "clay" and substituting the phrase "capillary barrier."

Based on this, our interpretation is that the clay layer is continuous and acts as a confining layer with respect to vertical groundwater and constituent migration. As a compromise position, we agree to refer to the clay layer in the RI and FS reports as a "capillary barrier."

As detailed in the response to Specific Comment 19, this interpretation is based on a review of boring logs for all 160 borings, with the finding that only five borings were described as a sand or large-grained soil. Of these five borings, we believe that had they been drilled 1 to 5 feet deeper, fine-grained units would have been encountered.

NAPL Delineation

General Comment 10:

The nature and extent of NAPL contamination has not been presented clearly. It is possible that a fair amount of the substantial body of immunoassay data that was collected could be salvaged to assist in this delineation, though it is apparent that an additional delineation effort will be required in the Remedial Design phase. For this document, any salvageable immunoassay data should be combined with the existing analytical data to better show the approximate extent of NAPL throughout the Site. Source areas should be highlighted, and volumes (with clearly documented methods for calculation) should be provided, broken down by location, and possibly for several "proxies" for source areas (i.e., > 1,000 mg/kg, >1% solubility of most soluble constituent present in ground water, and >0.1% solubility of most soluble constituent present in

ground water). All calculations of area and volume must be clearly explained, with any variables defined and any equations used clearly drawn out (in other words, show your work). Please explain the queries used to obtain the data set upon which calculations are made (such that they may be easily replicated).

Response:

The nature of NAPL was thoroughly discussed in Sections 4 and 5. Specifically, Section 5.2 discussed the site-specific chemical and physical properties of creosote NAPL, including its viscosity, interfacial tension with water, wettability, solubility characteristics, and chemical composition based on site data whenever available. We agree to revisit these discussions and will provide additional language to make them more clear.

As agreed upon at the December 19, 2001 meeting, an appendix will be added to supplement Figures 4-1, 4-2, and 4-3 and to clarify the extent of NAPL at the site. This supplemental information will provide a written basis for Figures 4-1, 4-2, and 4-3, detailing assumptions, calculations, and methods used to delineate the extent of NAPL at the site.

As agreed upon at the December 19, 2001 meeting, the immunoassay data will not be used to delineate NAPL at this site.

As will be further described in the aforementioned new appendix that will be developed, the solubility-comparison approach to delineate NAPL at this site will not be used because the NAPL has sufficient visual and odor characteristics that render its absence or presence readily discernible in environmental samples.

Regarding calculations of NAPL area and volume, we agree to provide the aforementioned appendix that describes assumptions, computational methods, and data used, such that the calculations may be replicated. Actual volume estimates will be provided in the FS.

General Comment 11:

The mobility, or suggested lack thereof, of the NAPL has not been argued convincingly. The data do not support the conclusion that the NAPL is immobile. Rather, the data indicate that NAPL has seeped into the subsurface and collected in at least two areas of the uplands. The data do not clearly show that these are the only two such areas. While EPA agrees that it is consistent with the nature and behavior of creosote NAPL to have a low mobility, it is not clear that the data available conclusively prove that NAPL at this Site is immobile. The thickness of NAPL in some areas of the Site does suggest that, in at least those areas, NAPL has encountered a low-permeability layer which has inhibited downward migration, thus allowing it to pool to a significant thickness. This does not necessarily indicate, however, that downward migration has ceased altogether in that area, nor that NAPL has been vertically confined in all areas of the Site in which it occurs.

Response:

The differences in interpretations between EPA and Beazer/DuPont regarding NAPL mobility or immobility cannot be resolved, given the current database. We propose that the following terms described in Pankow and Cherry (1996) be used in the RI as a basis to discuss and evaluate the NAPL, its potential for mobilization, and subsequent remedial strategies:

"Residual NAPL" consists of small, disconnected blobs and ganglia of NAPL that are separated from each other. Residual NAPL does not enter monitoring wells and is difficult to mobilize, even using aggressive groundwater pumping strategies. Residual NAPL is typically found at the edge of a NAPL body. The relative permeability of residual NAPL is zero (Pankow and Cherry, 1996). Residual NAPL is therefore currently immobile and immobilizable in the future using proven remedial technologies (with the exception of excavation).

"Pooled NAPL" forms a continuous liquid phase in the soil. Unlike residual NAPL, pooled NAPL can be mobilized by groundwater pumping since the relative permeability of pooled NAPL is greater than zero. NAPL pools can form due to variations in permeability, particularly in horizontally bedded soils. Although the permeability variations need not be great, NAPL pools are more likely to form on relatively finer-grained soil layers including fine sand lenses, silt lenses, clay rich lenses, and clay layers (Pankow and Cherry, 1996). Pooled NAPL can be currently immobile due to hydrogeologic characteristics, but mobilized in the future using proven remedial technologies.

Based on these concepts, the site data show that:

- Most of the creosote NAPL below the water table is residual, and therefore not currently mobile.

- Based on the available data, creosote NAPL is pooled above the low-permeability layer (identified as the "capillary barrier" elsewhere; see response to General Comment 12) near monitoring wells MW-2A and MW-8A and is potentially mobile in the future. Based on the results of the RI, the NAPL at these two locations is not believed to be migrating horizontally or vertically, based on sampling results.

- Based on the available data (the fact of decreasing concentrations of constituents and the fact that only two wells exhibited NAPL), NAPL has not penetrated vertically downward through the capillary barrier and is not likely to in the future if the site remains unchanged. As noted in the December 19, 2001 meeting, we acknowledge there are various factors (i.e., severe earthquake was identified by EPA) that could hypothetically cause NAPL mobility, but we believe none of these pose a significant threat.

We agree there may be limited areas where pooled NAPL exists; however, we do not believe NAPL is currently migrating either horizontally or vertically.

Assuming EPA agrees with this line of reasoning, we agree to revise the RI and FS using the terms defined herein.

Reference:

Pankow, J. F. and J. A. Cherry. 1996. *Dense Chlorinated Solvents and Other DNAPLs in Groundwater*. Waterloo Press. Portland, Oregon.

General Comment 12:

Furthermore, it is apparent from the boring logs (such as SB-124, SPG-6, SPG-10, SPG-11, SPG-12, KPG-1, KPG-3, KPG-4B, PA2, PA2A, PA1, PA15, PA15A, PA17A, PA29, GFP-20 and GFP-25) that there is contaminant, specifically NAPL, in the Potomac Formation, contrary to assertions made in the text (i.e., page 4-3, "No NAPL was observed within the Potomac

Formation soils.... "). EPA feels that a significant presence of NAPL in the Potomac is unlikely. Nonetheless, in light of the presence of some NAPL, and the likelihood that the clay is not continuous, there exists at least the possibility for NAPL to migrate into the Potomac Aquifer, and that with time, the risk of such downward migration may grow. However, EPA understands that the dominant flow direction of ground water is towards the Christina River or Hershey Run most of the time, and that the vertical component of flow between the Columbia and Potomac aquifers is potentially rather small. Because of these conditions, coupled with the generally low mobility of NAPL and the substantial amount of existing data available, EPA believes that the existing data can provide for a reasonable estimation of NAPL distribution. EPA also feels that a further detailed delineation of the distribution of NAPL in the lower-most Columbia, Upper Potomac, and possibly even Lower Potomac, can thus be deferred to the Remedial Design phase.

Response:

Beazer/DuPont concurs with the basic conclusion in the comment, namely that "a significant presence of NAPL in the Potomac is unlikely." We believe NAPL is not mobile under current (ambient) groundwater conditions and can only become mobile by disturbing existing site conditions, for example remedial technologies that alter groundwater hydraulics. We do not believe the risk of downward migration increases with time because multi-component NAPLs such as creosote and coal tar in fact become less mobile with time due to preferential leaching of soluble NAPL chemicals. This preferential leaching, also known as weathering, results in NAPL that becomes increasingly more viscous, less soluble, and overall less mobile with time. Given the many decades that NAPL has been in the ground at this site, we believe the risk of NAPL mobilization is limited.

We agree with EPA that the existing database is sufficient to provide reasonable estimates of the distribution and volume of NAPL. We also agree with EPA that further, detailed delineation of NAPL distribution is best deferred to the remedial design phase.

We do not believe NAPL is present in the Potomac Formation. We believe that NAPL is limited to the Columbia Formation and that downward vertical migration into the Potomac Formation is inhibited by a continuous, low-permeability soil layer consisting of various mixtures of clay, silt, and fine sand that separates the Columbia from the Potomac formations. This low-permeability layer serves as an effective capillary barrier to downward vertical NAPL migration.

Those locations indicated by EPA as having NAPL present in the Potomac Formation are addressed as follows:

- SB-124: The absence or presence of NAPL in the Potomac Formation is questionable at this location because the boring was terminated in the capillary barrier. We believe Woodward-Clyde incorrectly interpreted the contact of the Potomac Formation as being above the low-permeability capillary barrier that separates the Columbia from the Potomac formations at this location.

- SPG-6: There is no evidence of NAPL in the Potomac Formation at this location. "Dry weathered NAPL seams" were observed in the interval sampled from approximately 9 to 10 feet below ground, which was classified by Woodward-Clyde as the Columbia Formation. None of the soil descriptions of samples collected from what Woodward-Clyde classified as the Potomac Formation contained any mention of NAPL.

- SPG-10: There is questionable evidence of NAPL in the Potomac Formation at this location because the boring was terminated in the capillary barrier. A "black dry weathered NAPL seam" was observed at a depth of 9 feet below ground at this location, but this interval is above the Potomac Formation. We believe Woodward-Clyde incorrectly interpreted the contact of the Potomac Formation as being above the low-permeability capillary barrier that separates the Columbia from the Potomac formations at this location.

- SPG-11: There is no evidence of NAPL in any of the samples collected at this location.

- SPG-12: There is no evidence of NAPL in the Potomac Formation at this location. "Trace NAPL seams and blebs" were observed in the interval sampled from approximately 6 to 7 feet below ground, which was classified by Woodward-Clyde as the Columbia Formation. None of the soil descriptions of samples collected deeper than 6 to 7 feet below ground indicated the presence of NAPL.

- KPG-1: There is no evidence of NAPL in any of the samples collected at this location.

- KPG-3: There is no evidence of NAPL in the Potomac Formation at this location. A "1-inch black dry weathered NAPL" seam was observed at a depth of about 14 feet below ground at this location, but this interval is above the Potomac Formation.

- KPG-4B: There is no evidence of NAPL in any of the samples collected at this location.

- PA2: There is no evidence of NAPL in the Potomac Formation at this location. "Brown and black DNAPL saturated sand" was observed at a depth of about 28 feet below ground at this location, but this interval is above the Potomac Formation.

- PA2A: There is questionable evidence of NAPL in the Potomac Formation at this location. The boring was terminated in the capillary barrier. "Trace thin dry weathered NAPL seams" were observed at a depth of about 21 feet below ground at this location, but this interval is above the Potomac Formation. We believe Woodward-Clyde incorrectly interpreted the contact of the Potomac Formation as being above the low-permeability capillary barrier that separates the Columbia from the Potomac formations at this location.

- PA1: There is no evidence of NAPL in the Potomac Formation at this location. A "slight NAPL sheen" was observed at a depth of about 22 feet below ground at this location, but this interval is above the Potomac Formation.

- PA15: There is no evidence of NAPL in any of the samples collected at this location.

- PA15A: There is questionable evidence of NAPL in the Potomac Formation at this location. The boring was terminated in the capillary barrier. A "4-inch NAPL saturated seam" was observed at a depth of about 30 feet below ground at this location, but this interval is above the Potomac Formation. We believe Woodward-Clyde incorrectly interpreted the contact of the Potomac Formation as being above the low-permeability capillary barrier that separates the Columbia from the Potomac formations at this location.

- PA17A: There is questionable evidence of NAPL in the Potomac Formation at this location. The boring was terminated in the capillary barrier. A "1-inch NAPL saturated seam" was observed at a depth of about 26 feet below ground at this location, but this interval is above the Potomac Formation. We believe Woodward-Clyde incorrectly interpreted the contact of the Potomac Formation as being above the low-permeability capillary barrier that separates the Columbia from the Potomac formations at this location.

- PA29: There is questionable evidence of NAPL in the Potomac Formation at this location. The boring was terminated in the capillary barrier. A "very thin black stained seam...weathered NAPL" was observed at a depth of about 26 feet below ground at this location, but this interval is above the Potomac Formation. We believe Woodward-Clyde incorrectly interpreted the contact of the Potomac Formation as being above the low-permeability capillary barrier that separates the Columbia from the Potomac formations at this location.

- GFP-20: There is questionable evidence of NAPL in the Potomac Formation at this location. The boring was terminated in the capillary barrier. "NAPL saturation in sand seams" was observed at a depth of about 13 feet below ground at this location, but this interval is above the Potomac Formation. We believe Woodward-Clyde incorrectly interpreted the contact of the Potomac Formation as being above the low-permeability capillary barrier that separates the Columbia from the Potomac formations at this location.

- GFP-25: There is questionable evidence of NAPL in the Potomac Formation at this location. The boring was terminated in the capillary barrier. Only "trace NAPL" was observed at a depth of about 11 feet below ground at this location, but this interval is above the Potomac Formation. We believe Woodward-Clyde incorrectly interpreted the contact of the Potomac Formation as being above the low-permeability capillary barrier that separates the Columbia from the Potomac formations at this location.

General Comment 13:

Whether NAPL in the subsurface is migrating into surface water in the Hershey Run marsh has not been clearly addressed in the document. EPA believes that such a condition may exist, and that a clearer presentation of the existing data will better portray the extent of subsurface NAPL in areas where ground water discharges to surface water, thus allowing an assessment of whether NAPL may actually be discharging. EPA feels that a further detailed delineation of this potential condition may be deferred to the Remedial Design phase.

In addition to the free product and residual NAPL that occurs throughout much of the subsurface areas, NAPL is also quite prevalent on the surface of the upland in a semi-solid form, referred to throughout the text as "weathered NAPL", as stringers and "blebs" in the shallow subsurface, and even in the sediments of the Site. NAPL in non-upland sediments appears to be limited to shallow sediments in the Hershey Run channel, some areas of the Hershey Run marsh, and both the channels and marsh of the Western Central Drainage Area (adjacent to the South Ponds).

EPA believes that there currently exists enough data to reasonably estimate the volumes of NAPL contaminant present in the various media and areas of the Site, and that a further detailed delineation may be deferred to the Remedial Design phase.

Response:

We agree with EPA that there exists enough data to reasonably estimate volumes of contaminated material to complete the FS, and that a more detailed delineation of NAPL can be deferred until the remedial design phase.

The revised RI Report presented several figures on this issue. We propose to develop various plain and cross-section drawings of the various NAPL areas to allow the development of computer-generated NAPL volumes. This information will also be provided in the previously mentioned appendix.

COCs

General Comment 14:

The text should more clearly identify all COCs, and should then present them in relation to the identified source areas of NAPL / TPAHs, as PAHs appear to be the primary risk-driver and foremost contaminant. Since the data suggest that other COCs are generally present in the same locations as significant levels of PAHs, an effort should be made to determine if any areas exist where these COCs occur above any action level where PAHs are not present above an action level (specifically, the ERA RAOs). Please provide a figure mapping all locations where PAHs exceed the PAH RAO, and then highlight any points where another COC exceeds its respective RAO at a location where PAHs do not.

In addition, the document seems to identify several COCs, though not clearly, but then only discusses NAPL in Section 5, "Constituent Fate and Transport." All COCs must be addressed in this section, not just NAPL / PAHs. For any COC eliminated, a detailed rationale for doing so must be provided.

Response:

In our December 19, 2001 meeting, the issues concerning constituents of concern (COCs) were thoroughly discussed and an understanding was reached. In summary, COCs have been identified based on the constituents contributing to potentially unacceptable human health risks in the EPA-approved *Human Health Risk Assessment for the Former Koppers Company, Inc. Site, Newport, Delaware* (Environmental Standards, April 1999) and the constituents contributing to potentially unacceptable ecological risks in EPA's *Ecological Risk Assessment* (1999). These COCs include:

- PAHs (primary COCs);
- Phenolic compounds;
- Benzene;
- Pesticides (dieldrin, heptaclor epoxide, and per EPA DDT);
- PCBs;
- Metals (arsenic, chromium, lead, and zinc, and per EPA, cadmium, copper, and mercury); and
- Dioxins.

Section 5 will still address PAHs as the primary COC, and will be revised to include summary sections for the other potential COCs. In addition, a summary figure will present locations where NAPLs were observed, where PAHs exceed the PAH RAOs, as well as where other constituents were detected (and exceed screening criteria such as NOAELs, where appropriate).

General Comment 15:

The data indicate that PAHs, dioxin, and several metals are indeed site-related COCs. For example, dioxin occurs at three orders of magnitude greater than background, and several metals occur in high concentrations in wells where PAHs are found at high levels. Some pesticides also appear to occur at significant concentrations. EPA understands that there are a number of local and regional sources for several of the site-related COCs, but feels that the data indicate that the Koppers Site is one of these sources, and thus all COCs must be adequately addressed in the RI Report.

Response:

See response to General Comment 14.

Constituents of potential concern (COPCs) were identified during the initial screening of site data. COPCs were then evaluated in a quantitative risk assessment to evaluate whether an unacceptable risk was associated with any of these constituents. Those constituents contributing to potentially unacceptable human health risks are the COCs for the site. In our December 19, 2001 meeting it was agreed that COCs will be discussed in the RI; however, the source of the metals, pesticides, and PCBs will not be assigned. Also discussed during the December 19, 2001 meeting, EPA agreed the revised RI Report would not identify the potential source(s) of COCs. (EPA acknowledged that at least some of the COCs may be regional issues and not site-related.) Since it is Beazer/DuPont's position that these constituents are not all site-related, instead it was agreed that the RI will discuss COCs without referring to a specific potential source.

Background Issues

General Comment 16:

The modifications to the text that use more discrete terms for the levels of contaminants present are appreciated. However, a few contaminants have been described as being present at levels which are consistent with local or regional background. For example, dioxin is present at levels that are one thousand times greater than any background, but is described as being present at background levels. Such inaccurate statements must be corrected.

Response:

See response to General Comment 15. The identification of COCs is based on results of the risk assessments. Data regarding dioxin concentrations with respect to site levels versus background levels are undergoing review. Preliminary findings indicate matrix spikes as the reason for the apparent elevated concentrations. We are in the process of reviewing the historical laboratory analytical results associated with the samples.

General Comment 17:

Regarding background soil data, SIRB's (Site Investigation and Remediation Branch of DNREC) summary table of site background concentrations for metals could be referred to (Rob Allen, DNREC, provided a copy of the table to Maryann Nicholson). For sediments, please refer to SIRB's report of Christina River Sediment Assessment. Please review this information, and provide a discussion in the text.

Response:

SIRB's summary table of site background concentrations for metals in soils will be reviewed as a basis for revisions in the text of the revised RI Report. SIRB's Christina River Sediment Assessment will be reviewed as a basis for revisions related to sediment in the text of the revised RI Report.

Ground Water Flow

General Comment 18:

Ground water flow exhibits a radial pattern in certain tidal situations. EPA made this comment on the first draft; however, the comment was not addressed in this revision. While this will certainly be evaluated with new data once in the Remedial Design phase, the existing data suggest that flow in August of 1996 was to the north, northwest, west and southwest from the upland/process area. This condition has a number of implications regarding the location of "background" wells, as well as to the potential fate and transport of Site-related contaminant. If Beazer / DuPont believes that the data from August 1996 is in some way anomalous or erroneous, then an explanation must be provided, as for any excluded data.

Response:

As agreed at the December 19, 2001 meeting, the issue of groundwater flow will be revisited and reviewed pertinent to the concerns expressed in EPA's comments. After this evaluation is completed, any potential revisions will be discussed with EPA.

General Comment 19:

As a result of this radial flow, the MW-14 well cluster is questionable as an upgradient monitoring well. If this well is not a suitable upgradient/background monitoring well, then there may exist data gaps for the extent of NAPL contamination in the northern off-property portion of the Site. In addition, this may have an impact on the understanding of the extent of NAPL contaminant. Please include a discussion of this in the text.

Response:

See response to General Comments 11 and 18.

General Comment 20:

The data also indicate that a hydraulic connection between the Columbia and Potomac aquifers does exist, with flow between these aquifers occurring in different areas of the Site. The existing

data could be presented more clearly to address the directions of flow, as well as the estimated rates of flow, both laterally and vertically (see specific comments on figures to be generated).

Response:

The text and relevant accompanying figures will be revised to clearly identify estimated groundwater flow directions and estimated rates of flow (laterally and vertically).

General Comment 21:

While the text that stated "vertical permeability of the Columbia Formation is relatively low" was removed to satisfy a previous comment, it is important to note that this text had been based on a sole data point, which skewed the results to a lower permeability portion for the formation.

Response:

We do not agree that a sole data point skews the vertical hydraulic conductivity to a lower value for the formation. Given the existing limited database, it is difficult to determine whether the sole vertical hydraulic conductivity measurement is lower than, in the middle of, or at the higher end of the permeability distribution for the formation.

General Comment 22:

Please provide, as was requested in previous comments, construction and operation details for the nearby production supply wells (operated by Artesian Water Company).

Response:

This information will be provided to the extent it is available.

Summary of General Comments

The following items are summarized here, for the sake of clarity:

- *As the data indicate, the clay layer is not continuous, and is not likely an effective barrier against vertical migration of contaminants.*

Response:

See response to General Comment 9.

- *The data strongly suggest that Columbia and Potomac aquifers are an interconnected system.*

Response:

See responses to General Comments 4 and 5.

- *Metals and dioxins generally occur in high concentrations in samples that have high concentrations of TPAH. Therefore, metals and dioxins are site-related to some extent,*

and the Site is a source of PAHs, metals, and dioxins. For the most part, other COCs are co-located with significant concentrations of PAHs.

Response:

See responses to General Comments 14 and 15.

- *Dioxin is present at the Site at levels that are three orders of magnitude (1000 times) greater than background.*

Response:

See response to General Comment 15.

Specific Comments

A number of specific comments are detailed below.

Specific Comment 1:

Executive Summary; page ES-2. *Please remove the second statement. The RI report does not demonstrate "how the natural geologic conditions and physical form and location of the NAPL combine to limit the areal extent and mobility of the NAPL materials."*

Response:

It is proposed that the second statement under the "Soil Investigation" bullet, on page ES-2 of the Executive Summary, be revised as follows: "This RI Report describes the relationship of natural geologic conditions, physical form of NAPL, and location of NAPL in an effort to demonstrate the limits of the areal extent of NAPL and the barriers inhibiting the potential mobility of NAPL." We believe the NAPL mobility is extremely limited as evidenced by monitoring wells MW-2A and MW-8A, which are the only wells to date where NAPL has been identified.

Specific Comment 2:

Executive Summary; page ES-3. *Please remove penultimate and ultimate statements; specifically, "...this report describes how naturally occurring attenuation may be mitigating the movement of constituents from potential source areas." Natural attenuation was not properly or sufficiently evaluated (that is, in accordance with EPA guidance) to support these types of conclusions. EPA understands that anywhere that creosote NAPL is found, natural attenuation may be occurring.*

Response:

During the December 19, 2001 meeting, the proper use of the term "natural attenuation" was discussed along with alternative language. The text will be modified to state: "Among other results, this report describes how biodegradation of constituents, sorption, dispersion and dilution, chemical reactions, and volatilization may be mitigating the movement of constituents from potential source areas."

Specific Comment 3:

Section 2.1; page 2-2. *The segregation of NAPLs based on physical appearance may be a useful tool for presentation purposes. Please remove any statement concerning mobility from the report, unless specific testing pertaining to NAPL mobility has been performed and reported. For example, "blebs" are present in the soil layers. If they are not mobile, they would not have gotten into the soil layers to begin with.*

Response:

The physical description of the NAPLs is very relevant to their current mobility. We agree that the presence of NAPL indicates historical mobility, but not necessarily current mobility. As agreed upon in the December 19, 2001 meeting, the discussion of NAPL with respect to potential mobility will be revised to acknowledge hypothetical mobility, as noted in the response to General Comment 11.

Specific Comment 4:

Figure 2-1; page 2-5. *Figure 2-1 does not include reference soil boring locations as the text states; is this information shown elsewhere (besides in Appendix A)? Please provide these locations in a clear figure. Also, the location of MW-27A is not shown on Figure 2-1; please show the location of this well on the figure.*

Response:

It appears the comment refers to page 2-4, not 2-5. The soil boring locations are provided in Appendix A and on Figure 2-1. Figure 2-1 will be revised to include the referenced soil locations.

The reference soil sample locations provided on the figure in Appendix A will also be provided on Figure 2-1. The location of MW-27A will be provided on Figure 2-1.

Specific Comment 5:

Figure 2-1. *The sample location map (Figure 2-1) was too complicated because every sample location for every parameter was presented on a single map. All immunoassay sample locations were shown on the map, creating the impression of a very dense sample network. If immunoassay sample data are not useful to the site investigation, they should not be presented on the map. Please present all samples used on one map (such as the provided Figure 2-1), and then also provide an individual map for immunoassay samples, and for other unique sampling events.*

In addition, the sample location map (Figure 2-1) does not appear to include all of the sampling locations at this Site. In particular, most of the contaminant figures in Volume 3 of 3 of the RI (not revised) show additional sampling locations in the Central Drainage area that are not included on Figure 2-1 of the Revised Draft RI. There is some uncertainty about whether or not the data from these previous sample locations are included in the data analysis in the Revised Draft RI. These sample locations and the data associated with them need to be included in this document. Any sampling locations or samples excluded from presentation or analysis must be listed, mapped, and explained.

Response:

For clarity, per EPA's suggestion, Figure 2-1 will be reconfigured into two or more figures to differentiate the immunoassay sample locations from other sample locations. In addition, the sample locations will be reviewed to make sure all sample locations are presented on Figure 2-1 (and any new, corresponding figures) and that the data associated with these locations are also included.

Specific Comment 6:

Section 2.3; page 2-5. *EPA made this comment on the previous submittal; the Terrain Conductivity Investigation is overlooked as the significant investigative tool it was. A description of the Terrain Conductivity Study should (at the least) list the objectives of the evaluation, the methods of evaluation, and present a detailed description of the findings, e.g., what areas were identified for further investigation. It undermines the effort and the conclusions thereof to have the entire investigation relegated to an Appendix where its contribution to delineation of the nature and extent of site contamination are never discussed. The version contained in Appendix B of the RI report contains only a small portion of the original September 1994 submission WoodWard-Clyde made to EPA. EPA had previously requested revisions providing narratives describing the interpretations of the data to support the recommendations; please revise this section to address those concerns and comments, and to provide the detailed description of the study.*

Response:

The comment appears to refer to paragraph 3, Section 2.3.1, page 2-4.

In the interest of satisfying EPA's concerns expressed in this comment, it is proposed that paragraphs be added that make the following points from the September 1994 submittal from Woodward-Clyde:

- Objectives of the survey: the identification of potential geophysical anomalies, including possible subsurface features (e.g., buried fill, metal structures), or shallow soil/groundwater impact.

- Methods: Potentially disturbed areas and potential storage tank areas were evaluated on a grid basis of cleared areas. An EM-31 terrain conductivity meter was used to obtain readings to distinguish between background readings, shallow soil/groundwater impact, or buried metal/debris for the selected areas.

- Findings summary: Natural background readings were found for Areas D, J, K. N, and portions of F. Anomalies attributed to a significant amount of surficial debris was described as railroad ties, scrap metal, and broken glass. Anomalies attributed to possible subsurface impact were found in portions of Area B (along the eastern edge and in the middle), Area E (along the eastern edge and in the southwest portion), and Area F (in the northeast portion). Areas of potential creosite, diesel fuel, and fuel oil storage tanks were evaluated near the former Treating Building with findings indicating the possible presence of underground storage tanks (USTs). Similarly, the survey identified a potential gasoline UST in PAOI 1.

- Further investigations: The 1994 survey recommended soil borings for sampling and analysis in Areas B, E, and F and Areas D and K. Other areas were not recommended for additional soil borings because they were already slated for planned RI borings.

Specific Comment 7:

Section 2.3; page 2-6. *Please do not use words such as "residualized" to describe NAPL, unless they are adequately defined.*

Response:

Please see response to General Comment 11 for a definition of applicable terms.

Specific Comment 8:

Section 2.3; page 2-8. *The narrative concludes that a low correlation was established between the soil immunoassay data and the lab data, with false negatives at the 100 ppm concentration at 87%.*

The immunoassay data should not be entirely thrown out, although the data did not provide a true correlation with lab method data. The immunoassay test is a semi-qualitative method, which provides only non-detectable, low, medium, or high concentration, and is not intended to correlate precisely with lab data. The data may still be somewhat useful.

Immunoassay Results - The RI Report identified the PAH immunoassay screening data set as unusable due to poor correlation with lab results. A review of the summarized immunoassay data set suggests that the total disregard of the entire data set may be premature. There is an apparent variance in the level of correlation between areas; there was very good correlation from samples collected in the East Central Marsh, fair correlation in the industrial areas, and poor correlation in the West Central Marsh and Hershey Run Marsh. Immunoassay screening is highly subject to systematic errors. Such error may be associated with poor test execution technique, bad batches of test materials (kits), and improper sample preparation. Because the poor correlation was not evenly distributed across all areas tested, a systematic-type error(s) may have occurred. In such cases, it is often possible to salvage portions of the data set. It is therefore recommended that the immunoassay tests be closely examined. Some particular items to review include the following:

- *Determine if the same individual, or a number of individuals performed all the tests by reviewing the site activity logs and analysis logs. Run a correlation using only the samples that were performed by a single individual. Variation between individuals may occur.*

- *Segregate the sample data by test kits to determine whether the immunoassay vendor provided a "bad" batch of test materials.*

- *Compare physical soil characteristics (grain size and TOC) and detected chemical constituents to the levels of correlation between screening samples and analytical data. This will rule out the possibility of interferences between the test method and the environmental parameters.*

- *Consider increasing the level or error for the tests. This may raise the detection limit, but may increase data usability.*

There was a large effort expended to obtain this data. It would be a shame not to be able to use any of it. Please also make sure that EPA has been provided with an electronic copy of this data.

Response:

Refer to minutes of the December 19, 2001 meeting and responses to General Comment 10 and Specific Comments 5 and 48 regarding use of the immunoassay data.

Specific Comment 9:

Section 2.3; page 2-12. *Please provide a listing of which wells were Phase I wells and which were added in Phase II, along with the rationale for installing them.*

Response:

The citation provided does not correspond to either the 1997 or 1999 draft RI Report. The 1999 revised draft RI (Section 2.4.1) does provide a rationale for installation of the wells; however, it does not specifically state during which phase the well was installed. The phase (I or II) will be added to each description.

Specific Comment 10:

Section 2.4; page 2-14. *Please list which wells were Phase II wells. (See comment for page 2-12.)*

Response:

This information will be provided in Section 2.4.1 of the revised RI Report.

See response to Specific Comment 9.

Specific Comment 11:

Section 2.7.2; page 2-22. *This section should present the actual amount of precipitation that occurred during the sampling event and the amount of surface run-off the storm event resulted in.*

Response:

To the extent this information is available, it will be provided in the revised RI Report.

To the extent the precipitation amounts and amount of surface water run-off are available, these data will be added into Section 2.7.2.

Specific Comment 12:

Section 2.9; page 2-26. *Although the ecotoxicological analyses were performed by an outside source, the results should be included in the RI report for completeness. A summary of results*

and tables should be presented in the body of the report and the outside report included in an appendix.

Response:

The results of the ecotoxicological analyses performed by an outside source are included in the Ecological Risk Assessment. The revised RI Report will include a brief summary of results in the text along with a concise summary table. Although we disagree with the need to present the outside report in an appendix (given that the results are documented for the record in the Ecological Risk Assessment), we are willing to confer further with EPA on this issue.

Specific Comment 13:

Section 2.9.1; page 2-29. *The statement is made that according to EPA, "only mortality data will be used in the ecological risk assessment." This statement appears to be in opposition to the final ERA, which indicated that the ERA addressed ingestion of soil, surface water and sediment by higher vertebrates, acute and chronic toxicity to a suite of organisms lower on the food chain, and tissue burdens in both types of organisms. The ERA did utilize mortality as well as other lines of evidence, including chronic toxicity and tissue burdens. Therefore, the statement in the Revised Draft RI needs to be changed to more accurately reflect the data that was used in the ERA.*

Response:

The statement was accurate at the time it was issued. The text will be revised to reflect the lines of evidence that were in actuality used in the Ecological Risk Assessment.

The sentence "According to the EPA (Sprenger, 1997)...risk assessment" will be removed from Section 2.9.1 on page 2-29.

Specific Comment 14:

Section 2.9.2.2; page 2-31. *The report indicated that gut contents, liver, and kidneys were removed prior to sending the specimen off for analyses. The organs removed are bioaccumulation sites for many compounds. Please explain how the report will account for these missing organs when evaluating the total body burden (accumulation).*

Response:

The Ecological Risk Assessment, not the RI Report, should discuss data usability and data uncertainty issues. As such, this comment is more appropriately addressed in the Ecological Risk Assessment.

The small-mammal sample preparation was performed in accordance with the Phase III RI SOW, which will be reviewed and referenced, as appropriate, in the revised RI Report text to describe methods and rationale.

Specific Comment 15:

Section 3.1. *Neither the Cushing, Johnson, nor Woodruff publications are listed in the reference list. Only the Woodruff reference (Geohydrology of the Wilmington Area, 1981) is specific to the*

site area, in addition to which there are several other references published by the Delaware Geological Survey which are more relevant to the site lithologies than Cushing (which describes the entire Delmarva Peninsula) or Johnson:

- *Jordan, 1962, Stratigraphy of the sedimentary rocks of Delaware;*
- *Woodruff and Thompson, 1975, Geology of the Newark Area, Delaware;*
- *Woodruff, 1978, Geohydrology of the Newark Area, Delaware;*
- *Martin and Denver, 1982, Hydrologic Data for the Potomac Formation in New Castle County, Delaware*
- *Woodruff, 1984, Geohydrology of the Wilmington Area, Sheet 2 - Hydrologic Data.*

Please review these references and make any necessary revisions to this section before resubmitting the document.

Response:

The Cushing, Jordan, Johnson, and Woodruff publications will be added to the reference list in the revised RI Report. We have reviewed the available suggested references as well as additional references that add the following to the discussion of regional geology:
Holocene Deposits

- Sediments present in present-day marshes and stream valleys are composed of fine sands, silts, and clay (Woodruff and Thompson, 1972)

Columbia Formation:

- Composed of poorly sorted fluvial sands with some interbedded gravels, silts, and clays (Woodruff, 1977).
- Pleistocene streams cut valleys into the Potomac (Woodruff and Thompson, 1972).
- Thick sections of the Columbia (paleochannels) can be present, although the closest paleochannel is located southeast of the site (Woodruff, 1981).
- At a well closest to the site (Cc43-11), approximately 30 to 35 feet of Columbia Formation and Holocene sediments were observed (Woodruff, 1981).
- In the vicinity of the site, the thickness of the Columbia Formation was estimated to range from 30 to 50 feet (Spoljaric, 1967).
- Columbia sediments are composed of tan, brown to reddish brown, yellowish brown subarkosic sand and gravel with thin beds of silt and clay locally (Spoljaric, 1967)
- Columbia Formation provides recharge to the Potomac Formation (Woodruff, 1984).

Potomac Formation:

- Composed predominantly of fluvial deltaic clays and silts with some interbedded sands (fine-grained and may contain clay or silt) (Woodruff, 1977).
- Composed of variegated red, gray, purple, yellow, and white, frequently lignitic silts and clays containing interbedded white, gray, and rust-brown quartz sands (Woodruff and Thompson, 1972).
- At a well closest to the site (Cc43-11), approximately 80 feet of Potomac Formation soils were observed above the crystalline bedrock. Sand lenses were noted within the Potomac Formation at this well (Woodruff, 1981).

- Two zones (upper and lower) appear to be present in the Potomac that are hydrologically separated as evidenced by historical and current water levels (Woodruff, 1984).
- Recharge areas to the Potomac lie to the north and to the south of the site (Woodruff, 1984).
- Potomac groundwaters appear to be discharging to the Christina River (Woodruff, 1984).
- Upper sandy units of the Potomac Formation are not mapped at the site (Woodruff, 1984).
- The upper sandy unit may include thin interbedded clays and silts and is measured from the first Potomac sand lying beneath the Columbia Formation to the top of a mappable clay (Woodruff, 1985).
- The clay occupies the middle third of the Potomac Formation and separates the upper and lower zones (Woodruff, 1985).
- Potomac Formation was deposited in a fluvial environment (meandering stream system) based on low sand to clay rations, fine-grained overbank deposits, abundant lignite, and the apparent lack of direct hydraulic connections between the upper and lower portions of the formation (Woodruff, 1984).
- The Potomac thickens to the southeast of the site and sandy units tend to occur in the lower half of the formation (Woodruff, 1981).

Specific Comment 16:

Section 3.1. *The Cushing quotation is not relevant. This part of Delaware does not contain marine or littoral (term obsolete, replaced by neritic) deposits in any part of the section, and particularly not in the Quaternary. The Holocene marsh units might possibly be considered marine as they are tidal, however they are technically fluvial as they are associated with the Delaware River.*

Response:

The Cushing quotation will be replaced by the descriptions set forth under Specific Comment 15.

Specific Comment 17:

Section 3.1, Figures 3-1 to 3-5. *The Geologic Cross-Sections should be cited and discussed in the document.*

Response:

The geologic cross sections (Figures 3-1 to 3-5) are currently cited and discussed in Section 3.4, Geologic Characterization. If this section and corresponding subsections are not adequate, then further discussion with EPA may be necessary.

Specific Comment 18:

Section 3.2. *The Woodruff, 1984 map shows locations of 5 Potomac Formation water supply wells in nearby Newport; the logs of these wells would a good representation of local Potomac Formation units. Please include them in this document if at all possible.*

Response:

We are attempting to find geological logs for the five wells depicted in Woodruff (1984) and will incorporate the available data from those logs.

Specific Comment 19:

Section 3.4. *The first draft of this report stated, "...of the 155 soil borings drilled into the Potomac Formation, approximately 85% of these borings encountered the upper clay layer..." Therefore, the upper clay unit of the Potomac Formation was absent in 15% of Potomac Formation borings. The statement clearly identifies that it refers to borings drilled into the Potomac Formation, not those terminated at shallower depths, which is the interpretation offered in this revised draft. It is the responsibility of the author to clearly support and illustrate their interpretations so that others can follow and buy into the conclusion. Review of the individual boring logs and lab data suggests that the clay layer is not continuous. Please address this in the text.*

Response:

BBL has reviewed the Woodward-Clyde boring logs several times, and we believe that the finer-grained top of the Potomac Formation is present throughout the site. This finer-grained unit is primarily described as a silty and sandy clay, but also described as a sandy silt, clayey silt, clayey sand, silty sand, or a sand with clayey sand lenses. Of the 160 borings where the Potomac Formation was encountered (Appendix A), only five borings described the top of the Potomac Formation as a sand or larger grain-sized soil: WHSE-2, MW-12A, SPG-3, SWC-1A, and PA-28. Had these borings been drilled 1 to 5 feet deeper, fine-grained units likely would have been encountered based on the boring logs for WHSE-3 (encountered clay unit 1 foot deeper than the depth of WHSE-2), SPG-2 (encountered clayey sand unit 1.5 feet deeper than the depth of SPG-3), SWC-1B (encountered clay unit 2.5 feet deeper than the depth of SWC-1A), and PA-27 (encountered clay/clayey sand unit 3 feet deeper than the depth of PA-28).

The text of the report in Section 3.4.3 will be revised to describe the top of the Potomac Formation as a finer-grained unit composed of primarily silty and sandy clay, and also clayey and sandy silt, and clayey and silty sand that act as a capillary barrier between the Columbia and Potomac formations. The revised text will state: "Of the 160 borings where the Potomac Formation was encountered (Appendix A), only five borings described the top of the Potomac Formation as a sand or larger grain-sized soil: WHSE-2, MW-12A, SPG-3, SWC-1A, and PA-28. Had these borings been drilled 1 to 5 feet deeper, it is probable that fine-grained units would have been encountered based on the boring logs for WHSE-3 (encountered clay unit 1 foot deeper than the depth of WHSE-2), SPG-2 (encountered clayey sand unit 1.5 feet deeper than the depth of SPG-3), SWC-1B (encountered clay unit 2.5 feet deeper than the depth of SWC-1A), and PA-27 (encountered clay/clayey sand unit 3 feet deeper than the depth of PA-28)."

Specific Comment 20:

Section 3.4. *Also regarding the clay layer: (1) the deposits marking the top of the encountered Potomac Formation do not always consist of clay; (2) the visual boring logs underestimate the granular content of the Potomac units; and (3) geologic literature supports the lateral and vertical heterogeneity of Potomac Formation units, and the potential for hydrologic interconnection with the overlying Columbia Formation. It causes concern that the document was again submitted with (despite detailed comments regarding the first submittal) overly generalized descriptions of the geologic and hydrologic setting of the Site.*

Response:

With respect to item (1) of this comment, see response to Specific Comment 19.

With respect to item (2) of this comment, see response to Specific Comment 25.

With respect to item (3) of this comment, regional geologic and hydrogeologic information on the Columbia and Potomac formations will be reviewed and incorporated into the report text in Section 3.4.

Specific Comment 21:

Section 3.4; Figure 3-7. *Figure 3-7 does not depict the bowl-shaped feature formerly alleged by WoodWard-Clyde under the process area, and it was noted that the reference to this feature was omitted from the discussion of the Potomac Formation in Section 3.4.3. Is it now felt that this feature is not present?*

Response:

BBL has reinterpreted the surface elevations of the top of the Potomac Formation (i.e., the finer-grained units below the Columbia Formation). We believe there is a depression in the Columbia Formation within the process area, but we agree with EPA's request not to use the term "bowl-shaped" to describe it. We suggest use of the term "depression" or an alternative term suggested by EPA.

Specific Comment 22:

Section 3.4; Figure 3-7. *Also, Figure 3-7 is labeled "Top of Clay Elevation Map." Is this the elevation of the formational contact as indicated in the borings logs? Which clay (Marsh Clay or clay within Potomac) is this, is it continuous across the entire site, and how thick is it? In view of the discussion regarding the textural variability in the Potomac Formation, there is not a great deal of confidence that (1) the top of the Potomac Formation is described as a clay unit, or (2) even if so, that the "clay unit" described in the boring logs really is comprised of clay. Please provide revised clear figures and revise the text to discuss the stratigraphy in more detail.*

Response:

Figure 3-7 will be renamed "Top of the Potomac Formation Fine-Grained Units (Capillary Barrier)." The marsh clay is depicted on Figure 3-6.

The thicknesses of the fine-grained units at the top of the Potomac Formation are at least 0.5 feet, and in the seven borings where the entire thicknesses of the fine-grained units were encountered range from 1.3 feet (SB-609) to over 5 feet or more (MW-14, MW-15, SB-602, SB-603, SB-607, and SB-610). The thickness discussion in Section 3.4.3 of the report will be revised to discuss the compositions and the thicknesses of the fine-grained units at the top of the Potomac Formation in the 160 borings where the Potomac Formation was encountered.

With respect to items (1) and (2) of this comment, see response to Specific Comment 19.

Specific Comment 23:

Figure 3-7. *When looking at the boring logs, it is apparent that it would be impossible to correlate a Potomac clay across the site based on the limited number of borings and the irregularity of the thickness and description of the clay in the borings. The following was obvious*

from the boring logs, but not from any of the figures supplied in this Revised Draft RI report: (1.) There are locations where the Columbia Formation is in direct contact with a sand of the Potomac Formation; (2.) There are locations where creosote NAPL is in the upper portions of the Potomac Formation; (3.) The clay is actually a clay with sand, silt and gravel lenses and not very thick. The preceding need to be depicted on figures.

Response:

The generalized cross-sections of the report (Figures 3-2 through 3-5) will be modified to include revised NAPL observations and notes of the composition of the top of the Potomac Formation (see following responses).

We believe that with 160 borings taken during the RI, this information is adequate to identify that the Potomac Formation clay layer is adequately identified across the site. (See response to Specific Comment 19 for additional information.)

With respect to item (1) of this comment, there may be areas where the Columbia Formation is in direct contact with sands of the Potomac; however, those sands are clayey and silty sands that are finer-grained than the overlying Columbia Formation and act as a capillary barrier between the two units. Further applicable responses to this comment are provided under Specific Comment 19. Therefore, text will be added to illustrate this interpretation, and Figures 3-2 through 3-5 will be modified to show areas of direct contact as well as the area of a capillary barrier between the Columbia and Potomac formations, based on our interpretation of the boring logs.

With respect to item (2), please refer to response to General Comment 12.

With respect to item (3) of this comment, see response to Specific Comment 19. Figures 3-2 through 3-5 will be modified to reflect this interpretation.

Specific Comment 24:

Figure 3-7. *The thickness of a competent clay of the Potomac was not provided either through contouring or in cross section depiction to substantiate the contention that there is a competent thick clay layer across the entire site. Stratigraphy has been poorly correlated in the document. Only one figure depicts the Potomac clay in cross section, and inaccurately at that. These types of depictions aide in the evaluation of extent of contamination and the contaminant transport in the aquifer, and must be provided as was previously requested.*

Response:

As indicated in the response to Specific Comment 23, Figures 3-2 through 3-5 will be modified to show areas of direct contact between the Columbia and Potomac formations as well as the area interpreted as a capillary barrier.

Specific Comment 25:

Section 3.4. *Little data were collected by which to describe the texture of the Potomac Formation as quantified by lab analyses. Only six samples of this unit were found in the "Geotechnical Laboratory Test Results" in Appendix A; two samples from MW-4B (SB-602), two samples from SB-603, and two samples from MW-6B (SB-610). More importantly,* ***the grain size data***

generally indicated more granular conditions than the descriptions in the field logs. *For example, the following are comparisons of descriptions in boring logs to actual data:*

- *The upper sample from SB-602 (30 feet) is a Potomac Formation sample described in the boring log as "...stiff, predominantly red, silty clay to clay with silt, moderate to high plasticity and no coarse grains..."; however, the grain size analysis curve shows that it was a low plasticity silt, with 10% of the sample dry weight greater than the #200 sieve (sand).*

- *The deeper sample from SB-602 (43.5 feet) is a Potomac Formation sample described in the boring log as "...silty coarse to medium sand..." This was confirmed in the grain size analysis curve, which shows that it was a fine-medium sand with only a trace (10%) amount of silt.*

- *The sample from SB-603 (27.5 ft) is a Potomac Formation sample described in the log as "stiff to firm, red...silty clay to clay"; however, on the contrary, the grain size analysis curve shows that the sample was a silt with some sand, with over 30% of the sample dry weight greater than the #200 sieve (sand).*

- *The sample from SB-603 (35 ft) is a Potomac Formation sample described in the log as "...compact to dense, red...clayey to silty coarse to fine sand"; however, the grain size analysis curve indicated only a trace of fines (10%) and that nearly 90% of the sample dry weight was greater than the #200 sieve (sand) (the description would more accurately read "...coarse to fine sand with a trace of silt/clay").*

- *The sample from SB-610 (19 ft) is a Potomac Formation sample described in the log as..." compact, white, clayey fine sand grading to firm sandy silty clay"; the grain size analysis curve showed that the sample was a silt and sand (over 45% of the sample dry weight greater than the #200 sieve).*

- *The sample from SB-610 (39 ft) is a Potomac Formation sample described in the log as compact, ...clayey coarse to fine sand with silt and occasional silt and clay seams"; this description is verified by the grain size analysis curve, which shows that the sample was a sand (over 70% of the sample dry weight greater than the #200 sieve) with some silt (a granular deposit).*

Response:

Visual observations made in the field typically provide general description of the material. It is a qualitative assessment of the soil based on the existing conditions at the time of sampling (i.e., moisture content, odor, staining, blow counts, physical description, etc.). Laboratory analysis provides a detailed quantitative analysis of the grain-size distribution and other physical parameter testing. Both assessments provide valuable information, although they also have their limitations. In looking at the field descriptions (silty clay/clay with silt, silty clay to clay, sandy silty clay) and the grain-size analyses (silt, sandy silt, and sandy clay) for the top of the Potomac Formation in borings SB-602, SB-603, and SB-610, respectively, both the field and grain-size descriptions indicate significantly finer grain sizes than the overlying Columbia Formation, composed of sands and gravels with well-sorted beds.

As discussed in the response to Specific Comment 19, the text of the report will be revised to describe the top of the Potomac Formation as a finer-grained unit composed of primarily silty and

sandy clay, and also clayey and sandy silt, and clayey and silty sand that act as a capillary barrier between the Columbia and Potomac formations.

Specific Comment 26:

Section 3.4. *Also as illustrated by the field descriptions above, the field descriptions/classifications of soils were rather loose "geological" descriptions, which did not utilize standard terminology. Generally, the Unified Soils Classification System is preferred, in which the distribution of grain sizes are approximated by the use of the conventional descriptors "trace" (0-10%), "little" (10-20%), "some" (20-35%), and "and" (above 35%), and these visual estimates are verifiable by textural analysis.*

Since the lab data show that the descriptions in the boring logs are not always reliable, please revise the text to explain this discrepancy, and include this description in the discussion of the apparent lack of a competent clay layer.

Response:

As discussed in the response to Specific Comment 25, field observations provide a qualitative evaluation of the soil. Since field observations are essentially subjective judgments, distinguishing between the categories listed may not be exact (in comparison to quantitative laboratory analyses) and may even vary between qualified individuals. Therefore, the information compiled in boring logs is not necessarily unreliable, but rather provides another set of information to rely on.

The text will be revised to comment on discrepancies in boring logs versus analytical data.

See responses to Specific Comments 19 and 25.

Specific Comment 27:

Section 3.4. *While the Potomac Formation is indicated to be present in the boring logs from SB 602 and 607, this was (not very clearly) indicated by WoodWard-Clyde on the boring log by the solid lines which separate the overlying Columbia Formation from the underlying unit, which is not identified as Potomac Formation until the base of the boring log.*

Response:

Woodward-Clyde used a solid line to demarcate formation changes and dotted lines to delineate changes within a formation. The RI Report text will be revised to note this.

Specific Comment 28:

Section 3.4. *It is unlikely that the Potomac "clay unit" is present as a discrete entity beneath the entire site. As described in the logs of SB-602 and SB-607, and supported by grain size lab data as described here, the Potomac Formation contains a high percentage of granular material (predominantly fine to medium sand) intermixed with fines (the silt and clay fractions). Individual beds range from fine to massive, with a wide variety of textures seen throughout the Potomac section in any given boring. The fluvial-deltaic depositional subenvironment provides an optimal opportunity for lateral lithologic variability, which is one of the characteristics of the Potomac Formation stated repeatedly in the literature. Please modify all instances in the text*

which refer to the "discrete clay" (or similar phrases) to more accurately reflect what the data show (e.g., that there may be areas where clay occurs, but that it is unlikely to be a competent clay layer).

The document should include references from the local geologic literature, such as those listed here (see above). For example, the following are quotes from those references that have been reviewed by EPA, and contradict statements made within the submitted report.

> *"...Individual beds of sand or silt or clay are generally restricted in areal extent and thickness. Thus lithologic variability in both vertical and horizontal directions is a characteristic of the (Potomac) unit..." (Jordan, 1962)*
>
> *"...Potomac sediments were deposited by a stream system of coalescing alluvial fans... with sand layers that were not very large or persistent in location and time..." (Sundstrom et al, 1967)*
>
> *"...Potomac Formation sediments consist of variegated clay with interbedded sand, which are highly variable in lateral extent..." (Martin and Denver, 1982)*
>
> *"...measured water levels in Coastal Plain wells indicate that the Columbia Formation and the sands of the Potomac Formation act as a single leaky aquifer system in ...portions of the map area..." (Woodruff, 1978)*
>
> *"...the results of short term pumping tests should be interpreted with caution because of the extreme lateral and vertical variations in sediment type and the possibility of leakage through confining beds..." "...In some cases, the sands of the Potomac Formation and the Columbia Formation may act as a single hydrologic unit..." (Woodruff, 1981)*

Response:

We do not agree that the upper Potomac Formation has a "high percentage of granular material" because the descriptions and the grain-size analyses support the predominance of fines (silt and clay). See details provided in response to Specific Comment 19. Regional geologic and hydrogeologic information on the Columbia and Potomac formations will be reviewed and incorporated into the report text in Section 3.4.

Specific Comment 29:

Section 3.4. *The absence of a uniform clay confining bed is a very significant issue, because it ultimately relates to the potential distribution and migration of contaminants through hydrologic interconnection with underlying Potomac Formation units.*

Response:

See responses to Specific Comments 19 and 23.

Specific Comment 30:

Section 3.4. *It is not unlikely that the tight clay portions of the Potomac Formation exhibit low vertical hydraulic conductivity, such as the test data presented. Note that by referring to the boring logs, it can be seen that the samples submitted for permeability testing were not from the contact with the overlying Columbia Formation, but were generally collected lower in the section.*

Response:

In reviewing the boring logs, it is evident the samples submitted for vertical permeability testing were within less than 5 feet of the contact between the Columbia and Potomac formations except at SB-602, which was within 6 to 8 feet of the contact. The vertical permeability test results support the presence of a fine-grained unit at the top of the Potomac Formation that provides a significant capillary barrier between the Columbia and Potomac formations.

Specific Comment 31:

Section 3.4. *Regarding the permeability of the "marsh clay," two measurements of vertical permeability over a site area of 300 acres is not a convincing statistic. It is noteworthy that the clay was absent in the 16 Hershey Run borings. Please provide a clearer description and figure depicting the nature and location of the marsh clay.*

Response:

The revised RI Report simply documents the vertical permeability measurements obtained from the marsh clay, which is present over only a subset of the 300-acre area of the entire site. Given that the predominant sediments encountered in the marsh areas were silty clays, the two vertical permeability measurements are likely representative of the marsh clays. The second paragraph on page 3-4 of the revised RI Report and Figure 3-6 provide clear descriptions and depictions of the marsh clay layer. If this information is not adequate, then further discussion with EPA may be necessary to satisfy this comment.

Specific Comment 32:

Section 3.4. *The "geologic characterizations" hardly differ at all from those in the original submittal, and suffer from the same overgenerality as was commented on previously. Specifically, the discussion of the locations and elevations of geologic units encountered, and the relationship between physical characteristics (grain size, estimates of permeability, organic carbon content, etc.) and the potential for contaminant occurrence and transport, are all overly general. Please correct this in the next submittal.*

Response:

The geologic characterizations will be revised to include additional details from the literature, and the specific changes set forth in this response letter.

Specific Comment 33:

Section 3.4. *The statement, "Fluvial Quaternary (Pleistocene) sediments overlie the unconsolidated Columbia Formation" is confusing. The silty units described do not correspond*

to any recognized formation in the reviewed regional geologic literature. These deposits may be either silty interbeds within the upper Columbia Formation (which coarsens with depth), or the former pedogenic soil profile now found below fill material. Please clarify this and provide any reference which would provide a description of this unit.

Response:

Regional geologic and hydrogeologic information on the Columbia and Potomac formations will be reviewed and incorporated into the report text in Section 3.4.

Specific Comment 34:

Section 3.4. *Please show in which borings the Columbia Formation is absent (0 thickness). Please also show which soil borings document the thicker silty seams. Permeability in the Columbia Formation is anticipated to generally exceed the one value calculated, particularly in the gravelly seams and along the basal portion; one measurement is not statistically significant. Please modify the text to account for this uncertainty, and the likelihood that permeability exceeds that single measurement.*

Response:

The Columbia Formation was encountered in thicknesses ranging from a few feet up to 25 feet as described by Woodward-Clyde; the text of the report will be revised to reflect these thicknesses. Silt lenses were encountered in numerous borings penetrating the Columbia Formation, including most of the borings in the Process Area and the Drip Track Area such as DT-1, DT-3 through DT-7, DT-10, DT-16 through DT-18, DT-20 through DT-22, PA-1 through PA-2A, PA-5 through PA-9, PA-11 through PA-15A, PA17A, PA-19 through PA-21, PA-24, PA-26, PA-28 through PA-30. The text of the report will be revised to provide a description of the silt and clay lenses in the Columbia Formation and a table of the borings where silt and clay lenses were encountered.

In addition, text will added after the description of the vertical permeability test results to indicate that this test result represent only one sample from the Columbia Formation, and vertical permeability may vary within the formation. EPA should note that this test measured vertical permeability, which would be expected to be lower, given the silty nature of the Columbia Formation.

Specific Comment 35:

Section 3.4.1.3; page 3-6. *The second sentence on the last paragraph: "The 0- to 1-in sediment interval has a concentration of lead of 3.4 pCi/gm, which then decays to 1.0 pCi/gm in the 9- to 10-inch interval." If the age of the sediment in 0- to 1-inch interval is younger than that in 9- to 10-inch interval, therefore, it is not clear how the younger sediment decayed to the older one. Please clarify this text.*

The sediment depositional rates data presentation and evaluation is biased toward the finding that the marsh is depositional. In general, marshes are complex systems which inherently have areas of sediment deposition, scouring, displacement, and mixing, each of which may change location through time. As such, three samples are insufficient to derive any conclusion pertaining to the marsh as a whole.

Based on the reported depositional rates, the data indicated general peak periods which occurred in the early to mid-1980s. Insufficient research findings were presented in the report to suggest the cause of the peaks. In order to determine the probable cause of the deposition rate peak, many factors such as changes in surrounding land use, major storm events, and drainage changes must be thoroughly considered. For example, Churchman's Marsh used to have a greater dendritic flow pattern. However, during the construction of I-95, flow patterns were altered, resulting in severe scouring and erosional leveling of the marsh during periods of flooding. Therefore, sediment displacement and erosion are major sediment effects in the marsh. Although some areas may have experienced deposition, others are likely being scoured.

The report indicated that Hershey Run is wider at downgradient portions of the channel. It does not identify whether the channel depth has increased or decreased. Flow velocity is dependent upon cross-sectional area, slope, and volume, not a one-dimensional measurement. Fine sediment within Hershey Run, or any other coastal plain slow flow channel, is typical for the region, especially when it is a tidal or near tidal water.

Finally, even if the calculated rates are accurate, the rate of deposition is still too slow to be used as rationalization for contaminant encapsulation, especially as there is no guarantee of permanence. One single severe storm event could remove decades of deposition in a number of hours. In general, this discussion of deposition rates adds nothing to the RI. Please either revise this discussion to reflect these comments, or simply remove it from the RI Report.

Response:

We agree that three cesium samples "are insufficient to derive any conclusions pertaining to the marsh as a whole." However, we believe that this initial information is valuable in that it provides a baseline for the initial depositional rates and generally indicates that the area is depositional.

We have discussed with EPA in the past the potential need for additional sediment information based on potential remedial scenarios. As the EPA reviews the future revised RI Report and ultimately the FS, we can collectively identify the data collection efforts that are appropriate to support the selected remedy. Focused Hershey Run data collection efforts involving flow, cross-sectional area, scope, flow rates, etc., will be performed in support of the selected alternative.

Specific Comment 36:

Section 3.4.2; page 3-9. *The vertical permeability result for SPG-11 could be used in the table on page 3-9, which reports the vertical permeability result for the Columbia Formation sediment.*

Response:

The vertical permeability result from SPG-11 will be added in the table on page 3-9 of the text, as appropriate.

Specific Comment 37:

Sections 3.5.1, 3.5.2; pages 3-11, 3-15. *The hydraulic connection between the Columbia and Potomac aquifers is unclear in this report. For instance, on page 3-11, the first sentence in the second paragraph states that "the upper and lower hydrostratigraphic units are hydraulically separated by a stiff clay layer...", while on the next paragraph the first sentence states that "...the*

Potomac Formation clay layer was not encountered in approximately 80 of the more than 200 soil borings..." and on page 3-15, the second sentence in the second paragraph states that "...groundwater in the lower hydrostratigraphic unit appeared to be semi-confined by the overlying stiff clay layer." The term of "semi-confined" implies that the clay layer does not hydraulically separate these aquifers. Please be advised that the clay layer is discontinuous and creates "windows" between the Columbia and the Potomac aquifers. Through these "windows" the Columbia Aquifer is hydraulically connected with the Potomac Aquifer. The evidence is that both aquifers have similar groundwater flow directions (see figures 3-8 and 3-12, figures 3-9 and 3-13).

Response:

We suggest that the quotations in this comment may be out of context. We do not believe that the clay layer is discontinuous and creates "windows" between the Columbia and Potomac aquifers. Our interpretation is that there are very few geologic processes that could cause "windows" to appear in a clay. While both aquifers have similar groundwater flow directions, we believe this is not evidence of a significant hydraulic communication.

Our interpretation of the potential hydraulic connection between the Columbia and Potomac aquifers is that they are separated by a semi-confining aquitard with respect to groundwater flow quantities. The aquitard transmits limited quantities of groundwater vertically between the two aquifers, especially when compared with the larger quantities of groundwater flowing horizontally through the aquifers, due to its relatively impermeable nature. The aquitard consists of various fractions of clay, silt, and fine sand. In some locations the aquitard is appropriately characterized as a stiff clay layer, and in other locations it may be characterized as a clayey silt or silty clay layer. In either case, the site data show that the aquitard is continuous beneath the site (refer to response to Specific Comment 19) and serves as a capillary barrier to downward vertical migration of NAPL. We will revise the RI and FS to make the text reflect this interpretation.

Specific Comment 38:

Section 3.5; page 3-11. *EPA commented on this issue on the previous draft. Please remove the statement that "the upper and lower hydrostratigraphic units are hydraulically separated by a stiff clay layer encountered near the upper part of the Potomac Formation that is likely present as a uniform layer underlying the Site."*

Response:

Consistent with our response to Specific Comment 38, we will revise this statement as follows: "...the upper and lower hydrostratigraphic units are separated by an aquitard encountered near the upper part of the Potomac Formation that is continuous across the site, restricts vertical groundwater flow between the aquifers, and serves as a capillary barrier that prevents downward NAPL migration."

Specific Comment 39:

Section 3.5.1; page 3-13. *The last sentence on the second paragraph: "...during high tides, groundwater in the upper hydrostratigraphic unit appeared to be recharged by surface water in the West Central Drainageway..." but there does not appear to be any evidence to support this statement. Instead, according to Figures 3-8 and 3-9, the general flow direction of shallow groundwater in the Columbia was the same during the high tide and low tide periods. The*

difference between those two figures is that the groundwater level near the river was higher during high-tide period because the groundwater backed up in response to the rise of river stage, but did not reverse the flow direction. Please resolve this in the text.

Response:

We believe the hydrographs presented in Figures 3-10 and 3-11 provide clear evidence of tidally induced hydraulic gradient reversals. These figures were referred to in the RI in the sentence just prior to the one quoted by EPA in Specific Comment 39. Figures 3-10 and 3-11 are synoptic hydrographs obtained in the Christina River, West Central Drainageway, Hershey Run, and site groundwater monitoring wells. Figures 3-8 and 3-9 will be revised accordingly.

We agree with EPA that the groundwater level near the river was higher during high tide. We request clarification as to what is meant by the statement that "groundwater backed up in response to the rise of river stage." It is well documented in the hydrogeologic literature that when a stream undergoes an increase in stage, groundwater flow may be induced inland (e.g., Freeze and Cherry, 1979).

Specific Comment 40:

Section 3.5.1. *In sum, the conclusions of the hydrologic discussion are: (1) at times, radial flow emanates from the MW-2 cluster (which contains free product); (2) there is a discharge of the water table (upper unit) to the Western Central Drainage and to Hershey Run; (3) there is a relatively high horizontal hydraulic conductivity within the upper unit (mean of ~90 ft/day); and a lesser but demonstrably downward vertical flow component (which should be calculated). In other words, the contaminated ground water and free product in the former production area has, and continues to, impact surface water and sediment quality, and has the potential to impact (although does not appear to have impacted at present time) the ground water quality in the underlying Potomac Formation. Please revise the text to include and discuss these conclusions.*

Response:

We agree with EPA that at times there is a radial groundwater flow pattern centered around the monitoring well MW-2 cluster. Furthermore, we agree that shallow groundwater in upper hydrostratigraphic unit (water table) appears to discharge to the West Central Drainageway and Hershey Run, but only during low tides. The data show that during high tides there is a landward hydraulic gradient from these surface water features toward the site, and therefore we believe that surface water recharges the upper hydrostratigraphic unit (water table) during high-tide events. We also agree that the horizontal hydraulic conductivity within the upper unit (average of ~ 90 ft/day) is relatively higher compared with the vertical hydraulic conductivity. The vertical hydraulic conductivity of the upper hydrostratigraphic unit was measured at approximately 0.2 ft/day, which is roughly three orders of magnitude lower than the average horizontal hydraulic conductivity. We realize that the distribution of vertical hydraulic conductivity of the upper hydrostratigraphic is likely to be heterogeneous across the site and may vary by plus or minus an order of magnitude. But vertical hydraulic conductivity of the upper hydrostratigraphic unit was measured at only one location, and therefore the value of 0.2 ft/day provides the only basis for quantitative purposes.

The downward vertical flow component was calculated in the RI. Page 3-14 states: "Using the measured vertical hydraulic conductivity...a vertical gradient of 0.21, and an assumed effective porosity of 0.3, the vertical groundwater flow velocity is approximately 0.14 feet/day."

We do not believe that "contaminated ground water and free product in the former production area has, and continues to, impact surface water and sediment quality." There is no evidence that "free product" has migrated through saturated or unsaturated site soils to any surface water feature. The RI field investigation did not identify any shoreline blebs or visual NAPL areas entering surface water bodies. In addition, surface water sampling did not indicate the presence of SVOCs, PCBs, or PCDDs/PCDFs in storm-flow surface water samples. There is no evidence that impacted groundwater has migrated through saturated or unsaturated site soils to any surface water features. Given that the migration rates of creosote chemicals such as naphthalene (and related compounds) and most polyaromatic hydrocarbons (PAHs) are retarded by up to several orders of magnitude compared with groundwater migration rates, and also the fact that creosote chemicals are readily biodegraded in groundwater, the site data show that concentrations of creosote-related organic chemicals in groundwater are decreasing. There is also no evidence that metals are migrating to surface water features near the site via groundwater transport. While it is evident that creosote and related chemicals are present in shallow groundwater (upper hydrostratigraphic unit), the site data show that groundwater in the Potomac Formation (lower hydrostratigraphic unit) has not been impacted. Given that site operations commenced more than 50 years ago, and the fact that creosote and related chemicals become less mobile with time, we believe that the potential for downward migration of site chemicals into the Potomac Formation in the future is extremely low. The RI Report text will be revised accordingly.

Specific Comment 41:

Section 3.5.2 page 3-15. *The last sentence on the second paragraph states: "... published regional geologic information for the area indicates the thickness of the Potomac formation can be up to 200 feet..." This is incorrect. According to the map of K. Woodruff, 1981, the altitude of the top of weathered basement rock at this area is less than 100 feet below sea level. That means the total thickness of the sediments (including the Potomac, Columbia and recent deposits) above the basement rock is no more than 100 to 120 feet. Therefore, it appears that the maximum thickness of the Potomac Formation may be approximately 80 to 90 feet. Please update the text to reflect this.*

Response:

See response to Specific Comment 33.

Specific Comment 42:

Section 3.6. *The surface water characterization indicates that there are ponds on-site, and streams which flow into other streams, etc. A more detailed description is needed here, besides just that which one can see by looking at a USGS topographic map. Information on the bank height and vegetation, flow rates, stream bend descriptions (% cobble, silts, sands, etc.), drainage area, water quality measurements, are just a few pieces of information that should be presented, and are needed to properly evaluate aquatic habitats. Please provide any such information for the surface water features on the Site.*

Response:

The intended purpose of Section 3 is to summarize the physical features of the site, including a general characterization of surface water features as provided in Section 3.6. Additional information concerning aquatic habitats is provided in Section 3.7, Ecological Characterization. Surface water quality data are provided in Section 4.4 and Tables 2-7 and 4-10. Some detailed information (e.g., flow rate) for every surface water feature was not obtained in accordance with approved work plans. Additional characteristics will be provided in the revised RI Report to the extent that data are available. Any critical information regarding characterization will be collected as part of the preremedial design investigations, as needed.

Specific Comment 43:

Section 3.7. *Similar to the previous RI submittal, the text was seriously lacking in detail. Specifically, the presented text did not accurately present the volumes of ecological data collected at the site. The entire ecological characterization was presented in six and one-half pages, without a single data table. Please amend the text to more accurately describe the results of the vegetation characterization, soil macroinvertebrates, wildlife, aquatic and wetland habitats, benthic macroinvertebrates, fish, and threatened and endangered species.*

Response:

A great deal of data, not just limited to ecological data, was collected for the site. The overall intent of the RI is to summarize the information so that it is understandable to a lay person, and at the same time, provide enough detail so the site can be properly portrayed and the recommended remedial actions can be justified. We agree that the ecological component as well as archeological findings will be important considerations in future activities at the site. However, it is not certain as to what specific information and how much detail EPA would like to see presented for each of the categories listed for this general characterization section. Further discussions with EPA are needed.

Specific Comment 44:

Section 3.7. *Every piece of information gathered in the field should be presented in an organized fashion. If the authors are hesitant to provide a listing of every plant and animal encountered, tables could be presented. Also raw ecological data is not always sufficient. For benthic macroinvertebrates, as an example, metric analyses are very useful for interpreting species richness, population, diversity, health, etc. For plants and animals, relative abundances (e.g., rare, uncommon, common, abundant, and dominant) are also useful provided each abundance description is defined. The ecological characterization presented is essentially limited to the ecological data in the appendices.*

Response:

The Ecological Risk Assessment Report would be the more appropriate location for detailed presentation and discussion of every piece of ecological data collected. Typically, information contained within the ERA is summarized in the RI. The revised RI Report contains summary tables of observed vegetation and wildlife (Appendices D and F, respectively). In addition, summary tables of invertebrate/benthic community density summaries are provided in Appendix I. These tables could be relocated with the tables following the RI text with accompanying

further discussion of the ecological characterization. Further discussions with EPA will be necessary if further details are needed.

Specific Comment 45:

Section 3.7.2.1. *In comparing the vegetative similarities of the off-site reference marsh with the on-site tidal marshes, the tidal wetland vegetation portion indicates the same three dominant species (spotted touch-me-not, halberd-leaved tearthumb, and wild rice) for the on-site marshes and the same single off-site dominant species (spadderdock). Including the statement, "...nine other species were also noted to be present in the reference marsh outside the survey plot, including three species (bulrush, arrow arum, and sweetflag) that also ranked among the top 10 species in importance value in the on-site plots," does not confirm the ability to equate these two areas as similar with any conviction. Please provide more detail in this revision.*

Response:

The RI Report text will be expanded to further discuss the ecological characterization results to the extent that this information is available.

Specific Comment 46:

Section 4. *This entire section seems to avoid the issue of identifying site-attributable COCs. In the Human Health Risk Assessment screening (Tables 1-16, HHRA Report), URS screening was utilized. Then the potential COCs were further evaluated to identify the COCs that result in unacceptable levels of risk. Table 51 lists the COCs for the ground water matrix, Table 54 expands the COC list by considering NAPL, Table 72 lists the COCs in soil, Table 74 lists COCs in surface water, Table 78 lists COCs in sediments, and Table 84 lists COCs for the fish ingestion pathway. Many of the contaminants are identical from list to list; it should be relatively simple to compile one master listing. Please include a definitive list of COCs for the Site in the RI (for both human health and ecological risk). Please also present useful figures of this information.*

Response:

As stated for the general comment, a summary figure will be prepared. In addition, EPA should note the summary figures of constituents in soil and sediment in Appendix G for PAHs, phenolics, PCP, total BTEX, total VOCs, total pesticides, total dioxin (toxicity equivalent concentrations), arsenic, cadmium, chromium, copper, lead, mercury, and zinc. See response to General Comments 14 and 15.

Specific Comment 47:

Section 4.1. *The issue of background quality should be evaluated in detail as a part of the identification of site attributable COCs. EPA understands that in such an industrialized area, background levels of certain contaminants are expected to be high. Nonetheless, the data strongly suggest that a number of the contaminants found at elevated concentrations on-site actually came (at least in part) from the Site. Please amend the text to include a discussion of this, and to also include that the Site is arguably one of many sources for a number of contaminants found nearby at elevated levels. Wherever a contaminant is thought to have come from, its actual distribution and "nature and extent" across the areas of the Site must be presented.*

Response:

See response to General Comment 15.

Specific Comment 48:

Section 4.2.1. *The biggest data gap is the absence of consideration of the delineated NAPL boundary. The immunoassay data were collected to address how far PAH contamination extended beyond the edge of what was visually observed. The potential use of any salvageable immunoassay data is discussed elsewhere in these comments. Please refer to that discussion herein, and include in the revised document a clear and detailed discussion and presentation of the occurrence of NAPL in the various areas of the Site.*

Response:

See responses to General Comment 10 and Specific Comments 5 and 8. As agreed to in our December 19, 2001 meeting, the immunoassay data will not be used to evaluate NAPL presence. The NAPL areas are presented on Figures 1-3 through 1-5 of the draft Feasibility Study (BBL, 1999). These areas will be discussed in the revised RI Report and supported by tables presenting the borings and observations used to determine these NAPL areas.

Specific Comment 49:

Section 4.2.1.2; pages 4-2, 4-3. *Additional evidence that should also be used to infer the occurrence of NAPL in subsurface soils includes UV Fluorescence positive hits and high PID results. It is not clear why 2 ppm was selected as a cut-off value to indicate that no NAPL is present, but this may be a good value to use as a positive indication of NAPL if the PID measured greater than 2 ppm. Also, the last statement of this narrative should be corrected; NAPL was observed in the Potomac Formation based on the following boring logs: SB-124, SPG-6, SPG-10, SPG-11, SPG-12, KPG-1, KPG-3, KPG-4B, PA2, PA2A, PA1, PA15, PA15A, PA17A, PA29, GFP-20 and GFP-25. Please use this available information in the assessment and discussion of NAPL distribution (and include a description of how it was used).*

Response:

Refer to responses to General Comment 10 and Specific Comments 5, 8, and 48 regarding use of the immunoassay data.

We disagree that NAPLs were observed within the Potomac Formation at SPG-6, SPG-11, SPG-12, KPG-1, KPG-3, KPG-4B, PA-2, PA-1, and PA-15 (see boring-by-boring comments in response to General Comment 12). Further, NAPLs were observed only at the top of, but not within, the Potomac Formation at SPG-10, PA-15A, PA-17A, and PA-29. Thus of the 17 borings (and GFP-2A not identified by EPA) set forth by EPA only the following five borings have NAPL at the top of the Potomac Formation:

- SB-124 – Black like oil in sand seams within clayey silt
- PA-2A – Thin, dry weathered NAPL seams in sand above clay
- GFP-2A – NAPL blebs, dry weathered NAPL seams within clay
- GFP-20 – NAPL saturation in sand seams within clay
- GFP-25 – Trace NAPL within clayey, silty sand

The statement regarding "no NAPL was observed in the Potomac Formation" will be revised to reflect the presence of NAPL at the five aforementioned borings.

Specific Comment 50:

Section 4.2.1.3, Figure 4-3; page 4-3. *The statement is made, "The one NAPL observation from Hershey Run Drainage Area was located near the northern reach of Hershey Run." According to Figure 4-3, there are 11 Hershey Run Drainage (designated as HR-D?) samples where NAPL was observed, not just one. This correction needs to be made in the text.*

Response:

This sentence refers to the original Figure 4-3 in the 1997 RI, which identified NAPL distribution in the 0- to 12-inch sediment horizon. This sentence will be deleted since this figure was revised in the 1999 RI at EPA's request.

Specific Comment 51:

Section 4.2.2. *Volatile organics are both volatile and highly mobile. Detections now (20 years after operations ceased) in the several ppm range strongly suggest that a source of VOCs remains present in the subsurface. Table 4-1 omits sample depth information; surface soil (or sediment) samples should not be included with subsurface soil (or sediment) samples due to contaminant mobility. Please clarify this table, as well as the discussion of this issue in the text.*

Response:

As with all the tables in Section 4, the tables provide a summary of results. Depths for surface and subsurface soil sampling are provided in Table 2-1; depths for sediment sampling are provided in Table 2-6. Discussion of this issue in Section 4.2.2 will be clarified, as appropriate.

Specific Comment 52:

Section 4.2.2. *As with all COCs, please include in the RI a visual presentation of contaminant concentration data (there does not appear to be such a presentation for the VOC data).*

Response:

Per discussions in the December 19, 2001 meeting and as referenced in the materials provided at the meeting, VOCs are not listed as COCs, based on findings in the risk assessments. We believe the text presented in Section 4.2.2 and the data presented in Tables 4-1 and 4-2 are sufficient to convey the concentrations of VOCs.

Specific Comment 53:

Section 4.2.3. *Dots on a map are not as informative as concentration contours. Please provide clearer figures that include contours, as well as a delineation of PAH concentrations beyond the boundaries of visual NAPL.*

Response:

As discussed in the December 19, 2001 meeting, it is suggested that Figure 2-2 of the FS be combined with Figure 4-4 and with Figure 4-5 of the RI Report to more clearly delineate PAH concentrations.

Specific Comment 54:

Section 4.2.3. *The data presentation minimizes the concentrations of PAHs, metals, and dioxins. It should be brought out into the daylight that these concentrations, even of the lowest "quartile", are indicative that compound-specific concentrations significantly exceed industrial soil RBCs and ecological benchmarks.*

Response:

The text will be modified to remove "(i.e., within the upper quartile range)," which appears to be the main source of confusion. With respect to "ecological benchmarks," we would like to discuss this issue further with EPA.

Specific Comment 55:

Figures 4-4, G-3. *Compare Figure G-3 to Figure 4-4 in the revised RI. It is evident that many of the dots are missing (not just the sediment locations), and upon inspection, the stations that are missing are many of the "red dots" from the greatest concentration quartile (above 160 ppm). Although it is hard to tell what is present and what isn't, it appears that the missing include (but are not limited to): SB-114, SB-206, SB-207, SB-208, SN-11, SN-13C, SB-618, SB-209, SN-79, SB-217, SN-88, SN-99, SB-611, SB-127. The omission of a significant portion of the data for the primary site COC does not instill a great level of confidence that the RI Report is well considered or thorough.*

Response:

Figures 4-4 and G-3 will be reviewed for any apparent discrepancies and will be revised to reconcile any discrepancies or inconsistencies.

Specific Comment 56:

Figures 4-4, 4-5, 4-6, 4-7. *These figures show PAH data as dots on a map representing quartiles. PAHs are a diverse group of compounds with varying degrees of toxicity. It would be helpful to make separate figures for categories of PAHs or individual PAH risk drivers (i.e., B(a)P equivalents). Also, isopleths of contaminant concentration would give a better idea of what areas need to be cleaned up.*

Response:

The issue of data presentation needs to be discussed further with EPA. We are open to EPA's suggestions on this issue, but point out that previous figures in previous drafts had some of the details cited, but EPA suggested other approaches. We wish to provide figures that EPA wants, but seek clarification.

As discussed at the December 19, 2001 meeting, it would be extremely difficult to separate the figures into individual PAH risk drivers and develop concentrations based on isopleths due to the horizontal orientation of the samples. Specifically, this effort was originally attempted during the original RI development but was determined to provide an inaccurate depiction of the overall constituent concentrations at the site. For example, the Hershey Run Creek sampling effort consisted of a series of samples collected along the centerline of the creek. It is misleading to attempt to develop isopleths with sampling results collected in this horizontal orientation.

Specific Comment 57:

Section 4.2.3.1, Figures 4-4 to 4-7; page 4-6. *On page 4-6, a reference to the organization of these data into "...quartile ranges..." is referenced to Figures 4-4 through 4-7. The document does not clearly indicate why this quartile range way of presenting the data was used. In particular, phrases such as "...relatively elevated (i.e. within the upper quartile range)..." are not clear in their meaning. It would be more instructive to show the data in relationship to some benchmark value or range associated with ecological toxicity. Then the "relatively elevated" phrase would have some ecological risk meaning.*

Response:

A description of the rationale for quartile ranges was provided on Page 4-7; this description will be enchanced in the revised RI Report text. As noted in the response to Specific Comment 54, we wish to discuss the issue of "benchmarks" further with EPA.

Specific Comment 58:

Figures 4-4, 4-5, 4-6, 4-7. *Figures 4-4 through 4-7 list PAHs; does this refer to total PAHs (carcinogenic plus noncarcinogenic) or just the carcinogenic PAHs (cPAH)? The figures should be more clearly labeled. Please also ensure that the revised document includes figures and discussions for TPAH, cPAHs, noncarcinogenic PAHs, and benzo(a)pyrene equivalencies. For each such figure, a discussion must be included as to how it was created (see discussion of figures elsewhere in this letter).*

Response:

As noted in response to Specific Comments 56 and 57, as well as the responses to Comments on Figures and Tables, additional discussions with EPA are needed with respect to figures and data presentation.

Specific Comment 59:

Figures 4-8 to 4-22. *The distribution of constituents on these figures should be depicted by isopleth (equal concentration line), rather than by discrete data points.*

Response:

See response to Specific Comment 56.

Specific Comment 60:

Figures 4-x. *In summary, regarding the map presentation, the only notable change in this revision is the relocation of selected maps from Appendix G up into the text as Figures 4-X. Although the base map is a great improvement over that used by WoodWard-Clyde, the maps suffer from large deficiencies: (1) locations are not labeled, prohibiting any cross-check against data tables; (2) the color scheme will not reproduce in a conventional black/white photocopy; (3) the concentration intervals selected for depiction (quartiles) are meaningless from a risk perspective; and (4) many data stations are missing.*

Response:

We believe these issues can best be resolved by conferring directly with EPA on each figure.

Specific Comment 61:

Figures 4-19, G-73. *Another example of the discrepancy of figures from the two volumes of the RI can be found when comparing Figure 4-19 (zinc in sediment) of the Revised Draft RI to figure G-73 (zinc in soils and sediment: 0-0.5 feet) from Volume 3 of 3 of the RI (not revised). Figure 4-19 does not contain all of the sample locations/concentrations that are listed as sediment on Figure G-73. Some of the zinc concentrations on Figure 4-19 (for example, 1220 mg/kg) are not found on Figure G-73 (comparable location shows 117 mg/kg). Some of the data on Figure G-73 indicates results from a sample and its duplicate, while the same sample location in Figure 4-19 only shows the lower of these two concentrations. Yet in another instance, the higher duplicate value is listed. Again, this raises uncertainty about which data were used in the analysis as well as just what information is trying to be shown in the figures of the Revised Draft RI.*

Response:

We will confer directly with EPA to resolve these issues regarding Figures 4-19 and G-73.

Specific Comment 62:

Figures 4-20, G-38. *Another issue with the contaminant concentrations as depicted on the figures has emerged. The TCDD concentrations in surface soils shown in Figure 4-20 in the Revised Draft RI do not confirm the information (total dioxin toxicity equivalent concentrations in soil and sediment: 0-0.5 feet) contained in figure G-38 (Volume 3 of 3 of the RI, not revised). For example, Figure 2-1 shows a TCDD concentration of 4.856 ng/g in the K Pond area; yet figure G-38 shows the total dioxin toxicity equivalent concentration in this same area as 0.133 ng/g. In fact, none of the data contained in Figure 4-20 of the Revised Draft RI matches with the data contained in Figure G-38 of Volume 3 of 3 of the RI, not revised). This brings into question the quality of these data as well as which data is correct compared to the data used in the analysis,*

Response:

We will confer directly with EPA to resolve these issues regarding Figures 4-20 and G-38. We note that the data inconsistencies appear to be related to inclusion of matrix spikes in the database; these discrepancies will be explained or resolved.

Specific Comment 63:

Section 4.2.6; page 4-8. *On page 4-8, section 4.2.6 (metals), the statement is made, "This RI report summarizes analytical results for the 10 inorganic analytes identified in the ecological and human health risk assessments as being of concern on the site." The text also needs to clearly discuss why the other analytes are not being carried forward in the risk assessment.*

Response:

See response to General Comment 14. This section of the report will be revised to discuss only seven metals (arsenic, cadmium, chromium, copper, lead, mercury, and zinc) as COCs based on the human health and ecological risk assessments. In addition, the text will indicate that the other metals detected in soil and sediment are summarized in Table 4-5 but are not discussed in this section because they are not identified in the risk assessments as posing unacceptable human health or ecological risks and are therefore not considered COCs.

Specific Comment 64:

Section 4.2.6. *A previous comment, regarding metal concentrations in soils and sediment in comparison to background, apparently has been addressed by the removal of the information. According to section 4.2.6 (metals), "This RI Report summarizes analytical results for the 10 inorganic analytes identified in the ecological and human health risk assessments as being of potential concern on the site." This RI report needs to address all of the analytical results to support why the 10 inorganics have been identified as being of potential concern.*

Response:

See response to Specific Comment 63.

Specific Comment 65:

Page 4-10. *There are two adjacent pages numbered "4-10." Please correct (and check for any similar).*

Response:

The pagination will be corrected.

Specific Comment 66:

Section 4.3. *Please identify where, if any samples were collected along the drainage pipe.*

Please discuss if BTEX compounds were detected in the vicinity of the UST in any other samples. This is the single "source" of contaminants mentioned (but not discussed) to date.

Please examine and revise such sweeping statements as "...No BTEX or other VOCs were detected in any of the ground water samples from the lower hydrologic unit..." This particular statement is inaccurate. Figure 4-24 shows 1 ppb of VOCs in MW-7B, as well as 30 and 40 ppb in MW-14B. Please explain how the Potomac at 14B is more contaminated with VOCs than the Columbia (14A). Please ensure that such a discussion is included in the text.

It is expected that the wells containing product would contain greater concentrations of hydrophobic PAHs. Please include a discussion here regarding the absence of contaminants (if that is clearly the case) in the lower hydrostratigraphic unit.

It is noteworthy, and not a coincidence, that dioxins and elevated concentrations of metals were detected in the well or wells having free NAPL product; this demonstrates the correlation between different types of COCs. As has been discussed in several meetings, and elsewhere in this comment letter, the data strongly suggest that the Site is one source of some contaminants that occur locally, and that the contaminants at the Site are frequently co-located. Please ensure that a clear and detailed discussion of this is included in the text, and that the distribution of all contaminants is clearly presented, both in text and in figures.

Response:

The former underground storage tank (UST) was located near wells MW-2S and MW-2A, where BTEX was encountered. The revised RI Report points out that BTEX and other VOCs were observed near wells MW-2A and MW-2S, but does not indicate that the former UST is the "single source of contamination." Per EPA's request, the revised RI Report will discuss the location of the former UST in relation to the BTEX results.

MW-14B is located hydraulically upgradient of the site. Therefore, constituent concentrations at this well do not reflect site conditions. The text of the revised RI Report will be revised to indicate that other VOC concentrations were observed in the Potomac Formation upgradient of the site. In addition, the text will be revised to indicate that only a low level of other VOCs (1 ppb) was observed once at one well within the Potomac Formation at the site.

The sentence on page 4-11 of the RI Report, "Low levels of SVOC compounds ... and MW-11B" will be replaced with the following sentence:

> "Only two SVOCs were detected in approximately 29 groundwater samples obtained from the Potomac Formation: one detection of di-n-butyl phthalate (1 ppb) and one detection of phenol (2 ppb)."

Although relatively higher concentrations of metals were observed in wells with NAPLs, those concentrations are more indicative of a solid phase than an aqueous phase. If one compared the concentrations with soil phase concentrations, the concentrations were not elevated.

With respect to dioxins, two low-level detections at a single well should not "strongly suggest" correlations.

Specific Comment 67:

Section 4.3.7.2; page 4-13. *The second paragraph states, "The dissolved oxygen values ranged from 2.1 to 12 mg/l..." which may not be correct. If, at saturation, water holds only 8 or 9 milligrams of oxygen per liter, please explain how the dissolved oxygen concentrations could reach 12 mg/l. It is possible that the DO meter used was not accurate.*

Response:

The data will be reviewed, and the revised RI Report text will be revised.

Specific Comment 68:

Section 5. *The comment that Chapter 5 neglects all contaminants except those found in creosote has not been addressed. This chapter still only discusses PAHs and not the other contaminants. Please include discussions of all identified COCs.*

Response:

See response to General Comment 14.

Specific Comment 69:

Section 5.1; page5-1. *The second sentence of the second paragraph states, "Three main water-bearing zones were identified which influence fate and transport of constituents as solutes and NAPL; fill and non-Columbia Quaternary deposits; the stratified Columbia Formation and the underlying low-permeability clay of the Potomac Formation". Please explain how the low-permeable clay is classified as one of the "main water-bearing zones." Also, this description of the site hydrology as consisting of 3 water bearing zones is inconsistent with the "upper and lower" hydrologic regime previously discussed. Please clarify this.*

Response:

Comment noted. The intent of this sentence was that three main hydrogeologic controls were identified that influence the fate and transport of constituents as solutes and NAPL. The term "water-bearing zones" will be deleted. This sentence and other text throughout the RI and FS reports will be revised to be consistent with the "upper and lower hydrostratigraphic unit" concept.

Specific Comment 70:

Section 5.1. *As previously discussed, describing the Potomac Formation clay as "continuous" is not sufficiently supported by the data. Although the Potomac in this area generally contains considerable variegated clay, its fluvial deltaic depositional environment resulted in deposits that are laterally quite variable in texture, with varying amounts and sizes of granular material (sands and gravels). Please ensure that Section 5, as elsewhere in the document, is revised to reflect that the clay of the Potomac is likely not continuous.*

Response:

See response to General Comment 9.

As discussed in the meeting of December 19, 2001 with EPA, one way to approach the issue of whether the clay layer is "continuous" or not is to put the issue in the context of potential NAPL migration. Whether the clay layer is "continuous" or not is subsidiary to the issue of whether or not a barrier exists or structural controls exist to prevent or minimize NAPL migration. And we believe such a barrier does indeed exist.

It is therefore proposed that in Section 5, and elsewhere in the RI, text will be revised to reflect this understanding, taking care to avoid absolute, definitive statements but providing a context supported by data. Specifically, as agreed in the December 19, 2001 meeting with EPA, an

appendix will be prepared that explains methods and assumptions related to NAPL delineation, and ultimately, potential remediation soil/sediment volumes.

Specific Comment 71:

Section 5.1. *The data do not support that site-related constituents are "...mostly limited to areas close to historic source areas." The deposition and sorption of metals and PAHs to tidal marsh and channel sediments are ubiquitous in the lower portion of the basin, and EPA understands that many sources of some of these contaminants are present within the watershed. However, the data strongly suggest that the Koppers site is one of the sources of these contaminants. Please revise the text to reflect this.*

Response:

As agreed upon in the December 19, 2001 meeting with EPA, it will be most constructive to limit the descriptions in the RI to statements about COCs without reaching conclusions on sources. As stated by EPA in the December 19, 2001 meeting, "The upland portion of the site is cleaner," acknowledging that certain COCs (i.e., metals) are not necessarily site-related but instead more indicative of regional issues.

Specific Comment 72:

Section 5.2. *Please expand this textbook discussion to address what NAPL constituents were specifically detected from on-site samples, and then discuss the site-specific migration pathways for each class of COCs.*

Response:

Section 5.2 is a "textbook" or general academic discussion to lay a foundation for constituent fate and transport conclusions later in the revised RI report. The discussion in Section 5.2 involves a description of the chemical and physical properties of creosote NAPL, and the title of the subsection will be retitled with the word "NAPL" added to it. We will revise Section 5.3, Potential Migration Pathways, to discuss the potential "site-specific migration pathways" for all COCs.

Specific Comment 73:

Section 5.3.1; page 5-3. *The fourth line from the bottom of the page states, "A few areas with seams of saturated NAPL were observed ..." Please explain where, and revise this text to include more detail.*

Response:

The comment refers to Figure 4-2. Sample locations in green represent locations of NAPL observed in subsurface soils; sample locations in red represent locations of NAPL inferred to be present in subsurface soils; and areas with green and cross-hatching represent extent of probable NAPL zones (dashed where inferred). The text will be revised to specify the sample locations represented on Figure 4-2.

Specific Comment 74:

Section 5.3.1; page 5-3. *The second line from the bottom of the page states, "There do not appear to be NAPL pools present in subsurface soils at the site..." This is completely contrary to the fact that free-phase NAPL was surely identified in 2 monitoring wells, MW-2A and MW-8A, in the center of the former Process area. The free-phase NAPL was found on the bottom of the Columbia sand above the top of Potomac clay layer. The thickness of the free-phase NAPL may have varied with time. The presence of free-phase NAPL should be characterized in detail in this report.*

Response:

We agree that NAPL has been found in monitoring wells MW-2A and MW-8A and suggest that a compromise position can be found in how these findings are characterized. As noted in the December 19, 2001 meeting (see meeting minutes), we continue to agree with the characterization in the revised RI Report that subsurface soils at the site have "rather localized NAPL-saturated areas above fine-grained, low-permeability soils" that act as a "capillary barrier." We agree to review the terms used to describe NAPL-saturated areas (see response to General Comment 11).

Specific Comment 75:

Section 5.3.1; pages 5-3, 5-4. *Saturated NAPL seams were found in fill, the Columbia and the Potomac Formation sediments, therefore there exists a pathway for migration. Where the clay is present it may behave as a "barrier", but the upper portion of the Potomac, in contact with the Columbia, has sand in many places. Therefore, as discussed throughout these comments, there does not appear to exist a competent "clay layer" to behave as a barrier to prevent NAPL movement. The distribution of NAPL is a result of the heterogeneity of the formations. Please revise the text to reflect this.*

Response:

See response to Specific Comment 70.

Specific Comment 76:

Section 5.3.1; page 5-4. *The second sentence on the second paragraph states, "The clay layer observed at the top of the Potomac Formation likely provides a capillary barrier that prevents downward NAPL migration". As discussed elsewhere, the clay layer is discontinuous, and there exist windows between the Columbia and Potomac where the clay layer is missing. These windows provide potential pathways for contaminants to migrate downward. Please revise the text accordingly.*

Response:

See response to Specific Comment 70.

Specific Comment 77:

Section 5.3.3; page 5-5. *While EPA feels the statement, "constituent migration appears limited, and dissolved constituents do not appear to be migrating off-site due to natural attenuation*

processes occurring in groundwater at the site" could be correct, the data do not completely support the statement, and thus it should be removed. EPA also feels that the potential for this situation, if accurate, to change will warrant further characterization. In light of the data currently available, it is felt that this effort can be safely deferred to the Remedial Design phase.

Response:

As noted in the meeting minutes for the December 19, 2001 meeting, the use of the term "natural attenuation" will be reviewed, because of its regulatory connotations. The cited text will be modified, as appropriate. We concur with EPA's view that any further characterization be deferred to the remedial design phase. It appears from EPA's statement in the comment that the preliminary "natural attenuation" evaluation in Appendix G still serves a useful purpose in moving toward remedial design but that terminology should be reviewed with respect to regulatory considerations.

Specific Comment 78:

Section 6; page 6-1. *This section needs to include more than just conclusions. The data in previous sections is should be summarized here, and any conclusions drawn from that data clearly described as such (and made in such a way that the reader can easily follow along).*

The summary statements as presented are overly general, and lack justification. Since there exists an abundance of data, please ensure that it is used and referred to in support of more clear, accurate statements.

Response:

While it is difficult to discern what particular comments are viewed by EPA as "overly general" or lacking "justification," Beazer/DuPont will review this section and modify it, as appropriate, by providing specific references to RI findings

Specific Comment 79:

Section 6.1. *This section of the document should also summarize the site-related COCs detected, discuss their general occurrence, indicate what COCs pose a potential risk to human health and the environment, and propose general remedial action objectives.*

In the second bullet, the first statement is incorrect, as the data do not substantiate the conclusion that the horizontal migration of NAPL is restricted. The third bullet should indicate that NAPL has been detected in portions of the Potomac Formation. In addition, please remove the incorrect statement that "the geology of the region indicates that this clay layer is present throughout the site."

The report mentions (8th bullet) an on-site concentration of methoxychlor, and appears to compare it to a higher concentration of DDT found in the Christina River, in order to suggest that pesticide contamination is a regional issue. As is discussed elsewhere in this letter, EPA understands that there does exist widespread regional contamination for a number of COCs, but the data do suggest that the Koppers Site is one of several sources of various COCs. Please modify the text to clearly discuss concentrations and distributions found in the various areas of the Site.

The report suggests (11th bullet) that the metals data did not correlate with the NAPL data, and concludes that NAPLs are not a significant source of metals in soils and sediment. It is not clear that the data support this conclusion; rather, the data appear to suggest the opposite. Please modify the text accordingly.

This section also suggests that TCDD occurs at low levels, and is indicative of a regional issue. In fact, there are high concentrations of TCDD TEF on site, with the highest detected concentration of 7.3 µg/kg in the Process Area and a disturbed portion of the Upland area. The K Area is also contaminated with TCDD TEF, with 4.9 µg/kg in the surface soil and 6.3 µg/kg in the subsurface soil. EPA considers TCDD TEF soil concentrations greater than 1 µg/kg for residential receptors, and 5 µg/kg for industrial worker receptors, high (OSWER directive 9200.4-26, April 1998). The data also do not support the conclusion that these levels are typical of regional soil concentrations. The background samples (BG-1, BG-2, SB705, SB706, SB701, SB702, SB703 and SB704) had a maximum of 0.005 µg/kg TCDD TEF. The on-site data is three orders of magnitude greater than background.

Response:

As discussed in the meeting of December 19, 2001, and as summarized in the attachment to the minutes for that meeting, site-related COCs are defined in the response to General Comment 14. As for remedial action objectives (RAOs), it is suggested that preliminary RAOs can be stated in the revised RI Report, but RAOs may be more appropriately deferred to the FS, per EPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (1988).

With respect to the potential NAPL migration, refer to the responses to General Comment 11 and Specific Comment 3.

With respect to the "clay layer," please refer to the response to General Comment 9 and Specific Comment 19.

With respect to the issue of background concentrations of constituents and "regional" issues, we refer to meeting minutes of December 19, 2001 as well as the responses to General Comments 14, 15, and 17. As agreed at the December 19, 2001 meeting, the RI will describe site constituents and defer discussions or conclusions regarding sources of specific constituents (e.g., metals, PCBs).

Specific Comment 80:

Page 6-2. *The statement is made that "Metal concentrations were typically detected in the various drainageways at higher concentrations than in the upland areas... indicating the elevated metal concentrations may be a regional issue." This particular statement, as well as other like it, is a conclusion that is not well supported by the data (which also shows metals at elevated concentrations in several wells). As discussed throughout this letter, the data suggest that while the sources of metals contamination to the Christina River system are many, the Koppers site is one of these sources. Silts, clays, and organic matter in sediment may be "holding" higher concentrations of contaminants due to physical/chemical phenomena.*

Response:

As agreed at the December 19, 2001 meeting, the RI will describe site constituents and defer discussions or conclusions regarding sources of specific constituents (e.g., metals, PCBs).

Specific Comment 81:

Section 6.2; pages 6-2, 6-3. *First bullet, third statement: Please remove the phrase "due to natural attenuation processes," as this has not been demonstrated (or use other language). Please also remove the last statement, as this section is meant to summarize the findings of the RI, and not what is to come in the FS. Second bullet: Please remove the last statement for the same reason as the preceding. Please include a bullet that describes groundwater flow direction (which is radial at times, according to the data), and the location of any data gaps.*

Response:

With regard to the first bullet on pages 6-2 and 6-3, as noted during the meeting of December 19, 2001 (see minutes), the use of the term "natural attenuation" will be deleted or modified, as appropriate.

It is agreed this section is meant to summarize RI findings (the reference to the FS on page 6-3 was an attempt to set the stage for a discussion of remedial alternative components); text in the revised RI Report will be revised accordingly.

Similarly, the last statement referring to the FS will be removed from the second bullet on page 6-3.

Finally, an additional bullet describing groundwater flow direction, and the location of data gaps, will be included.

Specific Comment 82:

Section 6.4; page 6-4. *The conclusion indicates that PID, FID readings were similar to background. Please include the on-site PID, FID readings in this section, as well as the criteria used to determine background values. Please discuss whether any air samples were taken to determine the cause of the creosote smell at the site.*

Response:

The revised RI Report lists only a conclusion statement for Section 6.4 on page 6-4. The statement is derived from findings reported in Section 4.5, page 4-15. Reference will be made to these findings, but this section is intended to summarize conclusions, not reiterate findings in detail. Specific details from Section 2.10, including details from Figure 2-1 and Section 4.5 will be added, as appropriate.

Miscellaneous

Miscellaneous Comment 1:

A previous comment regarding salinity (changing salinity from 30 ug/L to 30 ppt) has apparently resulted in the text being deleted. Please explain if the salinity issue is of any significance.

Response:

The salinity text has not been deleted. We believe EPA may be checking the wrong page for corrections, which are on page 2-30 (Section 2.9.1.2) of the revised RI Report.

Miscellaneous Comment 2:

The report contains no references to any contacts (State or Federal) regarding threatened/endangered species. However, Delaware's Rare Native Vascular Plant List is cited. Contact should be made with DNREC's Natural Heritage Program, if this has no already been done. If contact has been made, the contact information should be cited in the reference section.

Response:

State or federal officials will be contacted, as appropriate, regarding threatened/endangered species; communications with state and federal officials will be referenced, as appropriate.

Miscellaneous Comment 3:

The issue regarding potential threatened and endangered species on-site has not been discussed with the Fish and Wildlife Service, either. The Service is available to discuss these issues. It is important that endangered species issues be resolved before completing the RI/FS. *Please redress this issue as soon as possible.*

Response:

See response to Miscellaneous Comment 2.

Miscellaneous Comment 4:

Lastly, besides stating the four federally listed species of plants were not encountered during the vegetative survey; documentation of contact with a federal agency regarding all threatened or endangered species, not just plants, needs to be provided.

Response:

See response to Miscellaneous Comment 2.

Miscellaneous Comment 5:

This site is very complex, with numerous characteristically different areas. In addition, the data set for this site is very large. The remedial options/alternatives and distribution of contaminants vary in a systematic way between the natural areas (wetlands) and industrial areas (uplands),

therefore it may be logical to approach the RI by evaluating the data using those same categories, as is likely useful in the FS.

Response:

We agree that the site is somewhat complex with the different areas and large data set. To a certain degree, it may be logical to assume that addressing the site based on natural areas would be a logical approach. However, the RI/FS primarily focuses on source areas of contamination, nature and extent of contamination, and potential migration pathways. It is these focal points that define the breakdown of most sites. Based upon where the Koppers site is within the RI/FS process, it would be extremely time-consuming and costly to restructure the documents. No restructuring is planned for this revision of the RI. Further discussion will be necessary if EPA would like to pursue reconfiguration of the reports based upon this comment.

Miscellaneous Comment 6:

A cursory comparison was made between the c-PAH and lead sediment data to the corresponding grain size results (% passing the 200 sieve) to determine the usability of the soil and sediment data. The sample locations targeted for this evaluation included those within Hershey Run, Hershey Run Marsh, and the White Clay Creek. As would be expected, the sample results with a percent passing value of less than 50% (the granular sediments) routinely had lower reported results for these organic-binding COCs. However, the samples having more than 50% passing results had a normal distribution of detected levels as would be expected. Of greater significance, many of the proposed "background locations" were often among those samples having the largest grain size. It is recommended that the data set be evaluated to determine whether the sample locations having large grain size results are appropriate for comparison with the remainder of the data set. It may also be useful to compare grain size data to TOC data; though TOC data could not be located (please provide copies, if available).

Response:

Grain-size and total organic carbon (TOC) may vary to a large degree within sediment. Physical factors, including water flow, water depth, surrounding land type, etc., can greatly influence the sediment type and composition. Background locations are selected based on their location, thus there is a degree of certainty that the selected location is not influenced by the site. Depending on the agreed-upon location, sediment composition will in all likelihood be different. Sediment data are typically normalized to a particular parameter such as percent fines or TOC so that the resulting constituent concentration will be comparable despite its composition. Therefore, background concentrations are usable and appropriate for comparison. Further discussions with EPA may be necessary if additional work is necessary with respect to this comment.

Comments on Figures and Tables

There are a number of issues relating to the figures as presented in the Revised Draft RI Report. While many of the comments are presented here, it may be most effective to work out the specific details of the final figures in meetings with the RPM.

Comment 1:

Common issues with the figures include the following:

- *Site features are lacking (i.e., surface water bodies, labels, roads, railroads, buildings, etc.).*

- *Data points are missing, and if omitted, no explanation is given as to why.*

- *Contours are needed, as well as an explanation of how the points and algorithm to generate them were chosen.*

- *It is not clear on the figures where sample locations are, and where actual "hits" have been found. For example, please present maps with hollow circles for all points that were analyzed for a given contaminant at a given depth, and then indicate "hits" or "exceedances" with a solid symbol, then use the solid symbols to generate labeled contours. Please present data tables of the "hits" presented, as well as tables for any omissions or problem data, along with an explanation of how the query to obtain the data sets was formed, a justification for any data omissions, and a description of the method for interpolation.*

There were sample locations identified in the text that were not present on the sample location maps. For example, some of the sample locations used to estimate the sediment deposition rates were not discernable. Please include clear figures showing sample locations for various media, as well as the various geologic and hydrogeologic units.

The maps showing ground water flow direction did not have surface water bodies depicted. This information is critical when trying to ascertain the relationships between subsurface and surface units. Groundwater flow direction should be specified for the Potomac Aquifer at the site to be west, west-northwest, west-southwest, south, and south-southeast and refer reader to figures with equipotential lines for Potomac Aquifer.

The revised report did not include the August 1996 high and low tide equipotential lines. The August 1996 high and low tide data set demonstrate a varied flow direction for the shallow aquifer seasonally. This is significant to the conceptual site hydrogeologic model. Most importantly, there is a potential data gap in this down gradient direction which should be acknowledged in the report.

If it is contended that there were anomalous water elevation readings at MW-2A and MW-2S, then some explanation must be given as to why. It is not sufficient to simply label them as such.

Response

It is agreed it will be most effective to work out specific details of final figures with EPA's RPM. With respect to EPA's common issues with the figures, the following responses are provided:

- "Site features are lacking ...." It would be most productive to know which features are necessary on which figures. To focus on a particular aspect, some figures omit features that may distract from the readability of the figure. It is suggested that this issue be reviewed on a figure-by-figure basis.

- "Data points are missing ...." Again, without specific knowledge of which data points are missing, it is difficult to respond. It is suggested that this issue be reviewed on a figure-by-figure basis to ensure that all site features are appropriately added.

- "Contours are needed, as well as an explanation ..." Clearly, contours are not needed on every figure. It is assumed that the database provided by EPA will allow the creation of

contours, as appropriate, and these will be included, as appropriate. It is suggested that this issue be reviewed on a figure-by-figure basis.

- "It is not clear on the figures where sample locations are, and where actual 'hits' have been found." While the existing figures do have sample locations identified and data listed, it is uncertain which figures are of primary concern for EPA. We suggest the figures be reviewed on a figure-by-figure basis to ensure more clarity.

- If specifics are provided by EPA on text vs. figure omissions with respect to sample locations, every effort will be made to resolve any discrepancies.

Comment 2:

As was previously requested, please provide a figure with the observed DNAPL in subsurface soils depicted on a groundwater elevation map and a map of the top of Potomac Clay to help corroborate some of the interpretations offered. Given the heterogeneity of the geology and the distribution of contaminants, it would be beneficial to identify data gaps by looking at each individual source and the distribution of the data (geology and DNAPL distribution) to determine any additional sample locations to better refine the extent of subsurface DNAPL.

Response:

It is suggested that Figure 2-2 of the FS be modified to accommodate this request. We are open to other suggestions EPA may have with respect to modifications of existing figures to satisfy EPA concerns. As for the determination of any "additional sample locations to better refine the extent of subsurface DNAPL," we believe either such additional sampling is unwarranted to forward the RI/FS process or such additional sampling should be deferred until the remedial design effort.

Comment 3:

The following figures should also be developed and included in the final RI: three topographic maps (one depicting NAPL extent in unsaturated subsurface soils, one in the fill/Columbia Aquifer and one in the upper portion of the Potomac), with only the soil borings depicted that can be used to estimate the extent of subsurface NAPL. The estimated extent of NAPL should be depicted as well. Highlight and include borings that show evidence of NAPL in the upper Potomac. Evidence should include visual, olfactory, high PID or OVA readings and any UV fluorescence positive detections from the Potomac sediment. The known subsurface NAPL extent should be overlain onto groundwater contour maps to identify potential data gaps for determining extent of groundwater contamination. On this same map, include the boring locations that detected NAPL in the upper Potomac. An isopach map of the sand of the Potomac Aquifer in contact with the Columbia, and an isopach map of the clay of the Potomac Aquifer should also be generated.

Response:

The figures presented in the RI appear to be sufficient to determine the nature and extent of constituents as a prelude to developing RAOs and remedial alternatives in the FS. Nevertheless, Beazer/DuPont is open to discussing this further with EPA to reach a mutually agreeable position. As noted during the meeting of December 19, 2001, it may be possible to move some figures from the FS into the RI, as well as revise some existing RI figures, to meet these EPA objectives.

Comment 4:

A map with the source areas outlined and labeled with the DNAPL occurrence and thickness should be presented for the subsurface. It could be separated into figures for Fill, Columbia Formation and Potomac Formation. Include all data points that can be used to evaluate DNAPL occurrence for each respective unit. For example, for interpreting DNAPL occurrence or absence in the Potomac Formation, depict only the borings that penetrate the Potomac Formation.

Response:

It is not clear what is meant by "source areas." It is agreed that separate figures will be created to illustrate DNAPL occurrence, or inferred occurrence, in fill, the Columbia Formation, and the Potomac Formation.

Comment 5:

The geologic cross sections presented appear to be misrepresenting the stratigraphy. For example, cross section A- A' depicts a clay layer in the upper portion of the Potomac formation along this cross section line, however, the two lone boring logs used to develop the section indicate a sand with some clay stringers in the upper portion of the Potomac formation (see boring logs SB- 607 and SB-609). A sand of the Potomac Formation appears to be in direct contact with the Columbia Formation at several locations on the site. Additionally, the total depth of the boring was not used in developing the cross section. SB-607 is 70 feet deep, yet only 45 feet were depicted on the cross section. Please revise the cross sections to conform to the data in the boring logs, and corroborate that data with that from the grain size analyses (see comment on inaccuracies in boring logs). Please ensure that the cross sections depict which logs were used to create them.

Response:

Comment noted. The geologic cross sections will be reviewed with respect to the boring logs.

Comment 6:

Table 2-2 (Vol. II). *"Summary of Monitoring Well Construction Specifications." The reference points are all indicated with respect to feet Mean Sea Level. This is unlikely. Please verify whether this table should be corrected to indicate feet below ground surface.*

Response:

Table 2-2 (Volume 2) will be reviewed, and amended, if necessary.

Comment 7:

Table 4-1 (Vol. II). *Page 6 of 8. The 37-Cl TCDD isomer cleanup standard is included on the table. The standards are not normally added to these tables. Normally, 0.8 ng/g of 37-Cl-2,3,7,8-TCDD is added as a cleanup standard. The values on this table range from 60 to 2.7 ng/g. Please explain these recoveries and if they affected the quantitation.*

Response:

Table 4-1 (Volume 2), page 6 of 8, will be reviewed, and amended, if necessary.

Comment 8:

Tables H-1, H-2. *As was previously commented on, Tables H-1 and H-2 (Appendix H) list the units for pesticides as ug/kg and mg/kg respectively. Since, Volumes 2 and 3 of the RI were not revised, this discrepancy has not been resolved. This still needs to be corrected or at least explained.*

Response:

The apparent discrepancy cited for Tables H-1 and H-2 of Appendix H will either be explained or otherwise resolved.

Comment 9:

Tables. *The majority of the tables are summary in nature. However, the adequacy and completeness of the summary is uncertain when only 2 marsh areas are included (Hershey Run, and Central Drainage) when there are at least 4 (including the East Central and West Central Drainages). The data from these additional marsh areas should be added to these tables.*

Response:

It is unclear as to what tables of what volume EPA is citing. If there is additional data from Woodward-Clyde to be included, such data will be included if available.